

# THE ADMINISTRATION'S FISCAL YEAR 2008 RESEARCH AND DEVELOPMENT BUDGET PROPOSAL

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## HEARING BEFORE THE COMMITTEE ON SCIENCE AND TECHNOLOGY HOUSE OF REPRESENTATIVES ONE HUNDRED TENTH CONGRESS

FIRST SESSION

FEBRUARY 14, 2007

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**THE ADMINISTRATION'S FISCAL YEAR 2008  
RESEARCH AND DEVELOPMENT BUDGET  
PROPOSAL**

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**WEDNESDAY, FEBRUARY 14, 2007**

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON SCIENCE AND TECHNOLOGY,  
*Washington, DC.*

The Committee met, pursuant to call, at 10:12 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

BART GORDON, TENNESSEE  
CHAIRMAN

RALPH M. HALL, TEXAS  
RANKING MEMBER

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The Committee on Science and Technology

Hearing on:

*"The Administration's Fiscal Year 2008 Research and Development Budget  
Proposal"*

2318 Rayburn House Office Building  
Washington, D.C.

Wednesday, February 14, 2007  
10:00 AM – 12:00 PM

WITNESS LIST

**Dr. John H. Marburger, III**  
*Director of the Office of Science and Technology Policy*

**COMMITTEE ON SCIENCE AND TECHNOLOGY  
U.S. HOUSE OF REPRESENTATIVES**

**The Administration's Fiscal Year 2008  
Research and Development  
Budget Proposal**

WEDNESDAY, FEBRUARY 14, 2007  
10:00 A.M.—12:00 P.M.  
2318 RAYBURN HOUSE OFFICE BUILDING

**1. Purpose**

On Wednesday, February 14, 2007, the Committee on Science and Technology will hold a hearing to consider the Administration's proposal for federal research and development funding for Fiscal Year 2008 (FY 2008). The Committee will hold another, separate hearing to examine the President's proposed budget for NASA (therefore, only brief analysis is provided for the NASA budget proposal). Subcommittees also will hold additional hearings regarding proposed agency budgets.

**2. Witness**

**Dr. John H. Marburger, III** is Director of the Office of Science and Technology Policy (OSTP). The mission of the office is to serve as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government. Dr. Marburger also co-chairs the President's Committee of Advisors on Science and Technology (PCAST) and supports the President's National Science and Technology Council (NSTC).

**3. Overview**

The President released his proposed FY 2008 budget on February 5. The budget proposes \$143 billion in federal research and development (R&D) funding, a 1.4 percent increase over the anticipated FY 2007 level.<sup>1</sup> The budget proposes increases for research programs within the American Competitiveness Initiative (ACI), as well as human space exploration, but proposes decreases in much of the remaining non-defense federal research and development portfolio.

The FY 2008 budget would provide \$11.4 billion for research within programs that are part of the ACI—the National Science Foundation, Department of Energy Office of Science, and National Institute of Standards and Technology lab research and construction accounts.

However, outside of the ACI programs, research and development for many agencies and programs would be cut compared to the FY 2007 level. For example, the following reductions are proposed in the FY 2008 budget:

- DOE Energy R&D (excluding Office of Science)—\$133 million or 9.2 percent
- National Institutes of Health—\$325 million or 1.1 percent
- Department of Agriculture R&D—\$245 million or 10.9 percent
- Department of Homeland Security—\$15 million or 1.6 percent
- Environmental Protection Agency—\$20 million or 3.5 percent
- NOAA—\$57 million or 9.5 percent

If research alone is considered separate from development activities, the President also is proposing significant cuts to many programs. Overall, federal basic and applied research would be cut by two percent compared to FY 2007, and in real terms, federal research would decrease for the 4th year in a row. For example, the FY 2008 budget proposes the following reductions in basic and applied research:

- NASA—\$16 million, or 1.1 percent
- National Institutes of Health—\$356 million, or 1.3 percent

<sup>1</sup>Unless otherwise noted, FY 2007 figures are based on the House-passed version of H.J. Res. 20.

- Department of Agriculture—\$206 million or 10.5 percent
- NOAA—\$42 million, or 8.3 percent
- Environmental Protection Agency—\$20 million, or 4.3 percent

In addition, according to an analysis by the American Association for the Advancement of Science (AAAS), federal research investments also are declining as a share of GDP, while other nations' investments are rising. Federal research investments have failed to match other nations, especially in Asia, government research is climbing dramatically. China and South Korea, for example, have committed to increase government research investments by 10 percent annually.

Below is more detailed analysis of how several agencies and programs within the jurisdiction of the Committee on Science and Technology fared in the President's budget proposal.

#### 4. Selected Agency Analysis

##### *National Aeronautics and Space Administration (NASA)*<sup>2</sup>

The FY 2008 budget request for NASA is \$17.3 billion, \$1.1 billion above the level in H.J. Res. 20. However, this increase would mostly fund human space exploration programs, specifically the International Space Station, Crew Launch Vehicle, and Crew Exploration Vehicle.

In the Science account, proposed funding for FY 2008 (and through FY 2011) would be constrained to grow at one percent per year. The impact on specific program areas would vary—for example, funding for Astrophysics (including the Hubble telescope) would decline from \$1.6 billion to \$1.3 billion over the FY 2008–11 period, while Earth Science funding would grow slightly between FY 2008 and FY 2009 and then decline for the rest of the decade to a level of \$1.4 billion in FY 2012. Planetary Science would grow from \$1.4 billion in FY 2008 to \$1.7 billion in FY 2012.

Aeronautics funding would decrease by \$336.4 million from the level of \$890.4 million in FY 2007. And, education funding would decline from the FY 2007 request level of \$167.4 million to \$149.6 million by FY 2012.

Funding for the Exploration initiative would increase from \$3.9 billion in FY 2008 to \$9.1 billion in FY 2012. Funding on Space Operations (Shuttle, International Space Station, Space Communications, and Launch Services) would decline from a level of \$6.8 billion in FY 2008 to a level of \$3.0 billion in FY 2012.

##### *Department of Energy*

The FY 2008 Administration request for the entire Department of Energy is \$24.3 billion. Of that, approximately \$7.5 billion is dedicated to non-defense activities in Science, Energy Efficiency and Renewable Energy, Nuclear Energy, Fossil Energy, and Electricity. The remaining \$16.75 billion is divided between the nuclear weapons mission, environmental cleanup and radioactive waste. Appearing for the first time in the President's budget is the Innovative Technology Loan Guarantee Program created in the *Energy Policy Act of 2005*. This program would provide loan guarantees for advanced technology projects that avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and have a reasonable prospect of repaying the principal and interest on their debt obligations.

##### *Office of Science*

As part of the President's American Competitiveness Initiative (ACI), the FY 2008 budget request for the DOE Office of Science is \$4.4 billion. This represents an increase of \$602 million, or 15.9 percent over the FY 2007 level.

The FY 2008 request for Basic Energy Sciences (BES) is \$1.5 billion, an increase of \$301 million or 25 percent more than the FY 2007 level. As the largest program within the Office of Science, BES conducts research primarily in the areas of materials sciences and engineering.

The budget would provide \$340 million for the Advanced Scientific and Computing Research (ASCR), an increase of \$106 million or 45 percent over the FY 2007 level. This includes funding to continue upgrading the Leadership Class Facility (LCF) at Oak Ridge National Lab, making it the world's largest civilian high performance computing system.

Biological and Environmental Research (BER) would receive \$532 million, an increase of \$70 million or 15 percent over the FY 2007 level. In addition to the role of BER in areas such as genomics and climate change research, the FY 2008 request

<sup>2</sup>Additional information on specific budget increases and decreases, as well as policy issues raised by the FY 2008 budget request, will be provided in the hearing charter for the upcoming hearing on NASA's FY 2008 budget request.

supports the startup of three bioenergy research centers to investigate biological processes for developing and deploying large scale, environmentally sound biotechnologies to produce ethanol from cellulosic biomass (plant materials).

The FY 2008 funding request for High Energy Physics (HEP) is \$782.2 million, which is \$50 million or seven percent more than the FY 2007 level. This program funds fundamental research in elementary particle physics and accelerator science and technology.

Fusion Energy Sciences (FES) receives \$428 million, a substantial increase (\$143 million or 40 percent) over the FY 2007 level. Of this amount, \$160 million would be dedicated to support the U.S. role in the International Thermonuclear Experimental Reactor (ITER). Finally, Nuclear Physics (NP) would receive \$471 million, an increase of \$75 million (19 percent) over FY 2007.

#### *Energy Efficiency and Renewable Energy (EERE)*

The Office of Energy Efficiency and Renewable Energy (EERE) would increase slightly by \$42.6 million (four percent) compared to FY 2007. However, the budget includes large cuts for the National Renewable Energy Laboratory (down 74 percent compared to FY 2007); Weatherization and State Energy Programs (down 37 percent); Industrial Technologies Program (down 20 percent); and the Federal Energy Management Program (down 14 percent), as well as the elimination of some renewable energy R&D programs.

Biomass and Biorefinery Systems would receive \$179 million (almost double compared to the FY 2007 level). This very large increase is intended to address the President's goal of making cellulosic ethanol cost-competitive by 2012 and also enable a supply of 35 billion gallons of alternative fuels annually in accordance with the Twenty in Ten program—a reduction of US gasoline usage by 20 percent in the next ten years—as outlined in the 2007 State of the Union Address.

Solar energy would receive \$148 million, \$64.6 million or 75 percent more than in FY 2007. This level supports the President's Solar America Initiative (SAI), which seeks to make electricity from photovoltaic cells cost competitive by 2015. Wind energy would be slated for \$40 million, approximately level with FY 2007 funding. As in the 2007 budget request, the Administration would eliminate R&D in Geothermal power, despite a comprehensive study released in January by the Massachusetts Institute of Technology that found that the large amounts of heat in stored in the Earth's crust could supply a substantial portion of the United States' future electricity requirements with minimal environmental impact and probably at competitive prices. Hydropower R&D would also be eliminated.

The FY 2008 request for Vehicle Technologies R&D, which includes funding to spur the development of technologies for plug-in hybrid vehicles, would be reduced by \$6.4 million or four percent. Building Technologies would rise by 25 percent compared to the FY 2007 level to \$86.4 million. However, the Industrial Technologies program, which aims to reduce the energy intensity of the U.S. economy by improving the energy efficiency of the Nation's industrial sector, would decrease by 20 percent (\$11 million).

#### *Office of Nuclear Energy*

Nuclear Energy (NE) receives \$568 million for research and development, with a large portion of that dedicated to the Global Nuclear Energy Partnership (GNEP). For the Nuclear office, this represents an increase of \$220 million, or 64 percent over the FY 2007 request, and \$347 million (157 percent) above the FY 2006 Congressionally appropriated amount.

The Administration unveiled the Global Nuclear Energy Partnership (GNEP) in 2006 as a plan to develop advanced, proliferation-resistant nuclear fuel cycle technologies that would maximize the energy extracted from nuclear fuels and minimize nuclear waste. GNEP has been very controversial in Congress, with little support in the House where only token funding has been approved. For instance, the Administration requested approximately \$250 million in FY 2007 for GNEP (through the Advanced Fuel Cycle Initiative—AFCI). If the CR maintains FY 2006 appropriated levels, GNEP will only receive roughly \$80 million for FY 2007. Nonetheless, the President's FY 2008 request for GNEP is \$395 million.

Chief among the concerns about GNEP is the cost of implementing the program (up to \$40 billion) and then deploying a fleet of the required technologies on a commercial scale (more than \$200 billion), and whether such a program warrants the costs. There are also issues with premature selection of technologies before the completion of a full system-wide analysis of what would be required. Many are concerned that DOE has not adequately demonstrated an ability to carry out large scale construction and operation of such a project without major cost and schedule overruns.

Finally, the Nuclear Power 2010 program also would receive a considerable boost with an FY 2008 request of \$114 million, which is more than double the amount provided in FY 2007. The increase is intended to go to continue activities in new reactor designs and licensing applications with the Nuclear Regulatory Commission to support an industry decision to build a new power plant by 2009.

#### *Fossil R&D*

Fossil Energy R&D would receive \$557 million in FY 2008, a two percent increase compared to FY 2007. Funding increases would go exclusively to coal R&D, including the Clean Coal Power Initiative (which aims to develop technologies that will increase efficiency of coal-fired power plants, reduce mercury and NO<sub>x</sub> emissions, and improve carbon capture and sequestration) and the FutureGen project to demonstrate near-zero atmospheric emissions electricity production.

The FY 2008 budget once again proposes to eliminate all oil and gas R&D, including \$50 million in direct spending (mandated in the *Energy Policy Act of 2005*) for unconventional onshore and offshore natural gas exploration technologies that would go largely to smaller independent oil and gas producers.

#### *Innovative Technology Loan Guarantee Program (LGP)*

The FY 2008 budget proposes \$8.4 million to fund the Office of Loan Guarantees, which will administer the Innovative Technology Loan Guarantee Program (LGP). The program was established in the *Energy Policy Act of 2005* to provide loan guarantees for renewable energy, energy efficiency, clean coal, advanced nuclear, and other innovative energy projects. The FY 2008 budget request assumes a loan volume of \$9 billion for such projects. Of this, \$4 billion is set aside for large electric power generation projects such as advanced nuclear and coal gasification with carbon sequestration. An additional \$4 billion is set aside to promote biofuels and clean transportation fuels, and \$1 billion for new technologies in electricity transmission and renewable power systems. The House CR for FY 2007 provides \$7 million for the administration of the program.

#### *National Science Foundation*

The National Science Foundation is the primary source of federal funding for non-medical basic research conducted at colleges and universities and serves as a catalyst for science, technology, engineering, and mathematics (STEM) education reform at all levels. NSF is one of the research agencies that the President, in his 2006 State of the Union Address, proposed to double over ten years as part of the American Competitive Initiative (ACI).

The FY 2007 budget request, which called for a \$439 million (7.9 percent) increase over the FY 2006 budget, was the first to reflect the ACI. H.J. Res. 20, the House-passed CR, would fund NSF at \$5.9 billion in FY 2007, a \$335 million (6.0 percent) increase from FY 2006, but a \$105 million (1.7 percent) decrease from last year's request. Specifically, H.J. Res. 20 appropriates \$4.7 billion for the Research and Related Activities (R&RA) account, and remains silent on the rest of the NSF accounts, signaling a continuation of FY 2006 funding levels for those accounts. The FY 2008 request of \$6.4 billion is \$513 million (8.7 percent) greater than what is provided for FY 2007.

#### *Research and Related Activities (R&RA)*

The FY 2008 request provides scientific research programs and research facilities (which comprise the R&RA account) with a \$367 million (7.7 percent) increase from FY 2007. The increases for scientific research are spread fairly evenly among all fields NSF supports. The largest percentage increases are for the math and physical sciences, computer sciences, and engineering directorates. The (non-medical) biological sciences and the social, behavioral and economic sciences directorates receive smaller increases.

NSF's contribution to the multi-agency National Nanotechnology Initiative increases by \$17 million (4.5 percent), including \$3 million more in support of research on the environmental, health and safety (EHS) aspects of nanotechnology. In particular, support is requested for a new, multi-disciplinary center to conduct EHS research and provide the science needed to inform the development of regulations.

#### *Major Research Equipment and Facilities Construction (MREFC)*

The MREFC activity funds the construction of large research facilities, such as telescopes and research ships. Funding for the operation and management of these major user facilities is included in the R&RA budget.

The FY 2008 request provides an increase of \$54 million (28.2 percent) for MREFC, which will allow for continuation of support for six construction projects and one new start. The new project, which is funded at \$33 million in the first year,

will provide for an upgrade to increase the sensitivity of an Earth-based observatory for the study of gravitational waves.

Three new projects proposed under last year's request are currently on hold due to funding uncertainties. Under the FY 2007 funding levels, NSF would be able to proceed on schedule with the two smaller projects (the National Ecological Observatory Network and Ocean Observatories Initiative), but would have only \$6 million of the \$56 million requested for the Alaska Region Research Vessel (ARRV).

#### *Education and Human Resources (EHR)*

EHR includes most of NSF's activities that support K–12 STEM education and the majority of activities that support undergraduate STEM education. EHR also includes most of NSF's graduate fellowship and traineeship programs.

The FY 2008 EHR budget request is \$751 million, a \$34 million (4.8 percent) increase from the FY 2007 request and a \$53 million (7.5 percent) increase from the FY 2007 level. Most of this proposed funding increase goes to increases in graduate research fellowships (+ \$11.2 million) and in activities to broaden participation in STEM fields (+ \$28.6 million). NSF has also launched a concerted effort to evaluate program effectiveness across EHR, and in particular, for its STEM education programs and projects.

Overall funding for K–12 programs in the FY 2008 request falls by \$15 million (nine percent) from the FY 2007 level, and is flat compared to the President's FY 2007 request. In addition, after proposing no new Math and Science Partnership (MSP) grants in the past two budgets, the Administration would make \$30 million available for new grants in FY 2008. However, the FY 2008 budget request is \$46 million—the same as the FY 2007 budget request and \$17 million less than FY 2006 spending.

#### *Agency Operations and Award Management*

This NSF account, previously called Salaries and Expenses, funds the internal operations of NSF. The FY 2008 request provides an increase of \$39 million (15.7 percent) above the FY 2007 level. NSF is facing the challenge of expanding its workforce to accommodate the demands created by the growing research budgets. H.J. Res. 20 would delay many planned new-hires in addition to planned upgrades of the electronic system used to receive and process grant applications. Most of the \$39 million increase for agency operations and award management in the FY 2008 budget request are slated for these two needs.

#### *Department of Homeland Security S&T Directorate*

The overall budget for the Department of Homeland Security's Science and Technology (S&T) Directorate is cut by \$174 million or 17.9 percent, and most research divisions would receive cuts in the FY 2008 request. This is the second year in a row in which the Administration has proposed budget cuts for the S&T Directorate. The only significant budget increase is for the Office of the Director of Innovation, which oversees the Homeland Security Advanced Research Project Agency (HSARPA), the external research funding arm for DHS. HSARPA funds high risk research and rapid prototyping in the field of homeland security-related technology development. This office increases by 58 percent to nearly \$60 million.

In 2006, Under Secretary for S&T Admiral Jay Cohen realigned the S&T Directorate. The FY 2008 budget reflects the new organization, and establishes new Offices for the Director of Transition and Director of Innovation. The research supported by the directorate is divided into three categories: basic research, innovative capabilities (applied), and product transition (development). The FY 2008 budget is strongly tilted towards biological and chemical countermeasures research, as in previous years, and this category represents 29 percent of the overall S&T Directorate budget. Whether this balance of priorities matches risk is unclear, and DHS is overdue to submit a report that will make certain that priorities are coordinated with a risk assessment. DHS currently expects to submit this report in February 2007.

In addition, there remains an imbalance between long-term and short-term research, with the Department showing a strong focus on product development at the expense of longer-term basic research (which accounts for only 10 percent of the FY 2008 request). The proposal of the formation of the Office of the Director of Transition, which would be responsible for working with DHS components to speed technology transition, suggests that short-term development will become an even greater priority for the S&T Directorate. Additionally, the lack of stability in the reporting structure brought about by the formation of new offices could cause problems for coordinating research and aligning priorities within the Department and the broader federal R&D enterprise.

In particular of note:

- The *Chemical and Biological Division* would be cut by \$84.6 million, which would be transferred to the Office of Health Affairs for the BioWatch program, the Biological Warning and Incident Characterization (BWIC) system, and the Rapidly Deployable Chemical Detection System. A recent report by the Department's Inspector General criticized the BioWatch program, specifically for poor management and quality control. This new office is likely a response to a call for stricter management protocols, but it is unclear what real changes will be brought about by its creation.
- Funding for the *Explosives Division* is reduced by \$41.5 million or 40 percent compared to FY 2007. This reduction is partially a result of the completion of the Counter-MANPADS program. If the Counter-MANPADS program is not considered in the budget calculation, the total funding for explosives countermeasures would decrease by \$22.9 million or 26.4 percent.
- Funding for the *Infrastructure and Geophysical Division* is reduced by \$50.8 million or 68 percent. Funding would be eliminated for two research institutes (including the Southeast Regional Research Initiative at Oak Ridge National Lab and Community Based Critical Infrastructure Protection Institute) and significant cuts would be made to the Regional Technology Integration Initiative.
- Funding for *Laboratory Facilities* would decrease by \$16.8 million or 16.0 percent from FY 2007. The reduction includes a decrease for the Plum Island Animal Disease Center (PIADC) and cuts in construction funding for the National Bio and Agro-Defense Facility (NBAF). These cuts could curtail efforts to prevent an outbreak of costly diseases in livestock, such as Foot and Mouth disease.
- Funding for *University Programs* is reduced by \$9.9 million (20 percent) compared to FY 2007. DHS plans to use the proposed funding to establish four new University Centers of Excellence in spite of the large reduction, thus cutting funding for all current centers. Additional goals for the program in FY 2008 include improving the capabilities of Minority Serving Institutions—which are currently under-represented—to conduct research in homeland security related areas and incorporating Minority Serving Institutions into the University Centers program. Examples of affected university programs include the National Center for Food Protection and Defense, of which the University of Arkansas is a participant.

#### *National Institute of Standards and Technology (NIST)*

The FY 2008 budget request for NIST is \$25.2 million (or four percent) less than the FY 2007 level. As part of the American Competitiveness Initiative (ACI), the Administration proposes increasing the NIST labs account by \$76.3 million (an 18 percent increase) and the construction account by \$35.3 million (a 60 percent increase). However, these proposed increases are more than offset by the Administration's proposal to eliminate the Advanced Technology Program (ATP) and cutting the Manufacturing Extension Program (MEP) by \$58.3 million (a 56 percent cut). Therefore, despite proposed increased for physical sciences research at NIST, once again, no new funds are proposed for the agency.

The FY 2007 House-passed CR would fully fund MEP and would provide \$79 million for ATP. With carry-over funds from the prior year, the ATP will be able to make at least \$40 million in new awards in FY 2007. However, the CR does not specifically state that ATP must make new awards, and in past years, the Administration has tried to block new awards even though the funds were appropriated.

#### *NIST Labs*

The NIST laboratories conduct research supporting U.S. technology infrastructure by developing tools to measure, evaluate and standardize, enabling U.S. companies to innovate and remain competitive. NIST helps U.S. companies, workers, and consumers by ensuring that standards are used to create a level playing field—not a barrier to trade—in the global marketplace. Under the FY 2008 budget request, funding for the NIST labs would increase by \$75.7 million or 18 percent, as part of the ACI.

#### *Advanced Technology Program (ATP)*

The ATP was created to foster economic growth through the development of innovative technologies. Through private/public partnerships, ATP's early stage investment is accelerating the development of high-risk, broadly enabling technologies and helping bridge the gap between the laboratory and the market place. Through May 2004, ATP co-funded 736 projects with 1,468 participants. Sixty-six percent of ATP

projects are led by small businesses, while more than 160 colleges and universities have participated in ATP projects. Benefit-cost studies from approximately 40 projects indicate an eight to one return on investment.

The FY 2008 budget proposes to eliminate ATP funding. The Administration justifies the termination of the ATP based on the growth of venture cap funds and other financial services for high-risk technologies, but has not provided documentation for these assertions.

#### *Manufacturing Extension Partnership (MEP)*

MEP is a proven public/private partnership in all 50 states and Puerto Rico with the mission of improving the competitiveness of small and medium-sized manufacturers. In FY 2005, MEP, a network of 59 centers, assisted more than 16,000 small manufacturers, providing a ten to one return on federal investment. In a survey of approximately 25 percent of MEP clients, they reported over \$1.3 billion in cost savings directly attributed to the program's assistance as well as creating \$6.3 billion in new or retained sales. The program also helped create/retain more than 53,000 jobs and increased investment by \$2.3 billion returned to the economy.

In the FY 2008 budget, the Administration proposes cutting MEP funding by 56 percent to \$46.3 million. The request includes \$11.3 million for overhead and oversight, leaving only \$35 million for actual grants to MEP centers—less than half of what is required to maintain a fully operation national network of MEP centers. (In FY 2006, \$92 million in grants were made to MEP Centers.) The Administration justifies the MEP cut by claiming that the program has evolved to where less funding is required, and that MEP services also are provided by private entities. However, a report by the National Association of Public Administrators concluded that the small manufacturing community is under-served and that MEP does not displace the private sector.

#### *National Oceanic and Atmospheric Administration (NOAA)*

The President's FY 2008 budget request for the National Oceanic and Atmospheric Administration (NOAA) is \$3.96 billion, 2.7 percent below the FY 2006 appropriated funding (which is generally expected to continue with no increases in FY 2007).

NOAA's mission includes weather forecasting and climate prediction, and management of fisheries, coastal and ocean resources. In addition, NOAA is responsible for mapping and charting coastal areas and providing other navigation support services through programs of the National Ocean Service. NOAA also conducts research in support of these missions including atmospheric sciences, coastal and oceanic science, climate and air quality research, ecosystem research, and fisheries and marine mammal research. Finally, NOAA also operates a constellation of satellites that monitor and transmit data for weather forecasting, climate prediction, space weather forecasting, and Earth and ocean science research.

#### *National Weather Service*

The National Weather Service (NWS) is the only office that receives a substantial increase in the President's FY 2008 request. The FY 2008 request for NWS is 6.5 percent (\$55.3 million) higher than the FY 2006 enacted levels.

#### *National Environmental Satellite Data and Information Service (NESDIS)*

The President's FY 2008 budget request would increase the overall NESDIS budget by three percent (\$26 million). The budget for NESDIS is dominated by the procurement, acquisitions and construction (PAC) accounts for the polar and geostationary satellite systems.

The Operations, Research and Facilities (ORF) account for NESDIS contains the programmatic funding for management, processing, analyzing, and archiving the data received from all of NOAA's weather monitoring equipment—ground-based and space-based. This program provides funding for data processing and analyses at data centers located in Kentucky, North Carolina, Maryland, and West Virginia. This account also supports a number of regional climate centers. The FY 2008 request for these accounts is \$20 million below the FY 2006 enacted levels. The FY 2008 request also eliminates \$4 million in funding for NOAA-NASA Partnerships to facilitate the transfer of research to operations. The Data Centers and Information Services accounts are reduced by \$18 million from the FY 2006 enacted levels.

NOAA operates two satellite systems that collect data for weather forecasting. The polar satellites (Polar-Orbiting Environmental Satellites—POES) orbit the Earth and provide information for medium to long-range weather forecasts. The geostationary satellites (GOES) gather data above a fixed position on the Earth's surface and provide information for short-range warnings and current weather conditions. Both of these systems are scheduled for replacement through the NPOESS

and GOES-R programs, respectively. Because of the long time period required to design and develop new satellite series, the procurement of a new series begins years before the current series has completed its production cycle. Therefore, NOAA's procurement budget in this area includes both funds to complete and launch current weather satellites (POES and GOES) and funds to design and develop the next generation of weather satellites (NPOESS and GOES-R).

The current series of Geostationary Operational Environmental Satellites (GOES-N, O and P) are nearing completion. GOES-N was launched last May. The FY 2008 request of \$80.4 million will support the continued development, procurement and launch of the remaining GOES satellites scheduled for April 2007 and October 2008, respectively. The request for GOES-R, the new series of geostationary satellites (\$279 million) has been reduced from the original FY 2008 estimate (\$532 million) to reflect changes in the program's content (reducing the number of instruments and planned number of satellites) and to provide additional time to re-structure the program.

The current series of Polar-Orbiting Environmental Satellites (POES) is nearing the end of its production cycle. The FY 2008 request to complete the current POES series is \$115 million.

The FY 2008 request for NPOESS, the new polar satellite series, is \$331 million. This is \$13 million less than planned for in last year's request. The funding will cover the continued development, production and risk reduction activities for the four key instruments to be included on the test satellite, the NPOESS Preparatory Project (NPP), scheduled for launch in 2010. The out-year funding profile for this program will be re-done and the prime contract for managing this program (with Northrup-Grumman) will be re-negotiated later this year.

#### *Oceanic and Atmospheric Research*

The office of Oceanic and Atmospheric Research contains over half of the research programs at NOAA. These programs are reduced by nearly \$11 million below the FY 2006 enacted levels, approximately a three percent reduction. The budget increases funding for Climate Research by \$23 million (13.5 percent). However, most of this increase is in the competitive research program and is accomplished by redirection of funds from Congressionally-mandated projects.

The 2004 report by the U.S. Commission on Ocean Policy recommended that Congress double the federal ocean and coastal research budget over the next five years. No budget proposal since the report was issued has included substantial increases in ocean research funding at NOAA. The FY 2008 budget request is higher than the President's FY 2007 request. However, the Administration's budget once again cuts the Ocean, Coastal, and Great Lakes Research account below the FY 2006 appropriation from \$127 million to \$105 million, a 17 percent decrease. Sea Grant receives a very small increase (\$166,000), and the Administration requests an increase for Ocean Exploration of about \$14 million.

#### *National Ocean Service*

The President's FY 2008 request for the National Ocean Service (NOS) would reduce funding for NOS programs by over 20 percent. The largest reductions are in the Ocean Assessment program (\$36 million) and in the Response and Restoration program (\$13 million) of the Ocean Resources, Conservation, and Assessment accounts.

#### *Program Support*

The Program Support account includes the NOAA Education Program. Overall, the Program Support account is reduced by about 10 percent as compared to the FY 2006 enacted level. Most of this reduction is due to a reduction in the procurement accounts, but the proposed funding for NOAA education programs is also reduced significantly below the \$38 million enacted in FY 2006 to a proposed funding level of \$19 million (an \$18 million or 48 percent reduction).

Chairman GORDON. Good morning. Welcome to this hearing on the Administration's Fiscal Year 2008 Research and Development budget.

Mr. Sensenbrenner was giving me a lesson on Wisconsin driving, and unfortunately, we don't all have that, so I know there are going to be some delays. Mr. Hall is en route, but has given instructions for us to move forward, and that is what we are going to do. We have the responsibility to do an oversight plan, and we are going to wait until Mr. Hall gets here to go into that.

So, we move forward, and thank you, Dr. Marburger. We know you came a long way this morning, and had a variety of barriers, and we thank you for getting those behind you and coming here with us.

We are here today to discuss the Administration's proposal for research and development funding, which really means we are here to discuss our nation's future competitiveness. You have heard me say this before, but it continues to ring true. As a father of a five-year-old daughter, I am deeply concerned that our children will be the first generation of Americans not to inherit a standard of living higher than their parents.

We need to get serious about ensuring that our country's economic strength continues to be the envy of the world. The fact of the matter is, the absolute dollars that we spend on research and development have been declining as a percent of our economy, and while our investments have been declining, other countries R&D investments have been increasing. A few years ago, South Korea overtook the U.S. in total R&D investment as a percentage of GDP; and China, which is raising its R&D by 10 percent a year, is on the path to closing that gap as well.

And that is why I had hoped to see a budget from the President this year that recognized these realities and shored up our country's competitive position. But in 2008, under this budget, R&D as a share of GDP would decline again, to below one percent, and while the budget includes some important funding increases, it lacks the priorities and consistency to ensure our competitiveness now and in the long run.

Proposed increases at some agencies are offset by decreases at other agencies. Physical science or sciences are boosted within the American Competitiveness Initiatives, but more than offset by decreases to NASA science programs, and by other cuts. And it is good to see the President's budget would increase overall funding for the National Science Foundation, but once again, funding for education programs at the NSF would decline.

Over the last four years, NSF K-12 funding has dropped almost 50 percent, more than \$130 million, and the 2008 budget request maintains these cuts. For more than 50 years, the National Science Foundation has been successfully implementing K-12 education programs. In fact, an Administration official at OMB recently agreed that NSF has "a strong track record for vigorous evaluation that could be a model for other agencies trying to improve science and math instructions." And in testimony, other reports presented to this committee over the years, including the National Academies *Gathering Storm* report, the number one recommendation for im-

proving math and science education has been improving teacher training.

Still, the Administration continues to ignore these facts, and instead, has focused 70 percent of the education component of its Competitiveness Initiative on a very narrow area of K–8 math curriculum at the Department of Education, an agency that already has been overburdened and underfunded. And I would like to make clear that the President's American Competitiveness agenda does not even include a specific science education component. This is a case of misplaced priorities, and I am hopeful that the Administration will reconsider scaling out the considerable experience and success of K–12 programs at NSF.

In addition, while important physical science funding at NIST would increase, the President continues to refuse to see the value in two bipartisan supported programs that have proven track records in aiding small businesses and creating new jobs: the Manufacturing Extension Partnership, and the Advanced Technology Program. The President's budget would cut MEP funding by more than half, and let me tell you what that would mean in the real world. It means more than 8,000 small manufacturing businesses will lose over \$650 million in cost savings and \$3 billion in sales. It means we won't create 25,000 jobs, and given MEP's ten to one return on investment, it means a loss of over \$1 billion to the economy.

And all of this after losing 100,000 manufacturing jobs last year alone, and 2.6 million since the President took office. The President also, once again, has proposed eliminating funding for the Advanced Technology Program, 66 percent of which goes to small businesses, and which provides a return to the Federal Government of eight to one. This is hardly a way to maintain our economic competitiveness in the Twenty First Century.

Finally, our country's continued economic growth will depend on having access to a clean, secure, reliable, affordable energy supply, and I am glad to see that the budget would continue to boost research funding for the Department of Energy's Office of Science even above the increases the Office received in 2007. Basic research can lay the foundation for reducing our country's energy dependence and addressing the impacts of global climate change, but today, too much energy R&D never gets beyond the lab.

Unfortunately, in the Administration's budget, several energy programs to help develop and demonstrate new technologies are slated for elimination. Others with proven track records would face significant cuts. Let me give you an example. The Industrial Technologies Program at DOE sets up partnerships between the government and industry to share the cost in R&D and technological assistance. The program helps businesses reduce energy use and increase productivity. According to the Department of Energy's own analysis, this program has helped 170 new technologies enter the commercial marketplace, and saved \$23 billion in energy costs. These results should not go unnoticed, but they have by this Administration, which has proposed cutting the Industrial Technologies Program by 20 percent.

In short, we need to get our priorities in order. Ten years from now, I want to look at my daughter and know that I did my part to help find the solution to these issues.

Dr. Marburger, I look forward to hearing your testimony, and discussing these issues further with you in my questions.

[The prepared statement of Chairman Gordon follows:]

#### PREPARED STATEMENT OF CHAIRMAN BART GORDON

We are here today to discuss the Administration's proposals for research and development funding, which really means we are here to discuss our nation's future competitiveness.

You have heard me say this before but it continues to ring true—As the father of a five-year-old daughter, I am deeply concerned that our children will be the first generation of Americans not to inherit a better quality of life than their parents. We need to get serious about ensuring that our country's economic strength continues to be the envy of the world.

The fact of the matter is, the absolute dollars we spend on research and development have been declining as a percentage of our economy.

And, while our investments have been declining, other countries' R&D investments have been increasing. A few years ago, overtook the in total R&D investment as a percentage of GDP. And—which is raising its R&D by 10 percent a year—is on the path to closing the gap as well.

That's why I had hoped to see a budget from the President this year that recognized these realities and shored up our country's competitive position. But in 2008, under this budget, R&D as a share our GDP would decline again—to below one percent.

While the budget includes some important funding increases, it lacks the priorities and consistency to ensure our competitiveness now and in the long run. Proposed increases at some agencies are offset by decreases at other agencies. Physical sciences are boosted within the American Competitiveness Initiative, but more than offset by decreases to NASA science programs, among other cuts.

It's good to see that the President's budget would increase overall funding for the National Science Foundation.

But once again, funding for education programs at NSF would decline. Over the last four years, NSF K–12 funding has dropped almost 50 percent, more than \$130 million. And the 2008 budget request maintains these cuts.

For more than 50 years, the National Science Foundation has been successfully implementing K–12 education programs. In fact, an Administration official at OMB recently agreed that NSF has a—quote—“strong track record for rigorous evaluation” that could be a model for other agencies trying to improve science and math instruction.

And, in testimony and other reports presented to this committee over the years—including the National Academies *Gathering Storm* report—the number one recommendation for improving math and science education has been improving teacher training.

Still, the Administration continues to ignore these facts and instead has focused 70 percent of the education component of its competitiveness initiative on the very narrow area of K–8 math curriculum at the Department of Education—an agency that already has been overburdened and underfunded.

I would like to make clear that the American Competitiveness Initiative does not even include a specific science education component.

This is a case of misplaced priorities, and I am hopeful that the Administration will reconsider scaling out the considerable experience and success of K–12 programs at NSF.

In addition, while important physical sciences funding at NIST would increase, the President continues to refuse to see the value in two programs that have a proven track record of aiding small businesses and creating new jobs—the Manufacturing Extension Partnership and Advanced Technology Program.

The President's budget would cut M–E–P funding by more than half. Let me tell you what that means in the real world—

It means more than 8,000 small manufacturing businesses will lose over \$650 million in cost savings and \$3 billion in sales.

It means we won't create 25,000 jobs.

And, given M–E–P's ten to one return on investment, it means a loss of over \$1 billion to the economy.

And all of this after losing 100,000 manufacturing jobs last year alone, and 2.6 million since the President took office.

The President also once again has proposed eliminating funding for the Advanced Technology Program—66 percent of which goes to small businesses and which provides a return to the Federal Government of eight to one.

This is hardly the way to maintain our economic competitiveness in the 21st Century.

Finally, our country's continued economic growth will depend on having access to a clean, secure, reliable and affordable energy supply.

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Basic research can lay the foundation for reducing our country's energy dependence and addressing the impacts of global climate change, but today too much energy R&D never gets beyond the lab.

Unfortunately, in the Administration's budget, several energy programs that help develop and demonstrate new technologies are slated for elimination. Others with proven track records would face significant cuts.

Let me give you an example—

The Industrial Technologies program at DOE sets up partnerships between the government and industry to share the costs of R&D and technical assistance. The program helps businesses reduce energy use and increase productivity.

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In short, we need to get our priorities in order.

Ten years from now, I want to look at my daughter and know that I did my part to help find a solution to these issues. Dr. Marburger, I look forward to hearing your testimony, and discussing these issues further with you in my questions.

Chairman GORDON. At this time, I will recognize our distinguished Ranking Member, Mr. Hall, for an opening statement.

Mr. HALL. Mr. Chairman, thank you, and good morning, Dr. Marburger.

I read this opening statement to you the first time I have read it to myself. Thank you for being here.

I am sure that we are all in agreement that we are challenged with achieving a very delicate balance between adequately funding our nation's priorities, while at the same time exhibiting fiscal constraint and in an effort to reduce the deficit, and to bring our budget under control.

Likewise, I know we are all in agreement that if we remain the world leader in competitiveness and innovation, we have to make the appropriate investments in research, development, technology, and math and science education.

I am pleased to see that the fiscal year 2008 budget request continues to build upon many elements of the President's American Competitiveness Initiative, particularly with regard to substantially increasing the funding for physical sciences and engineering at the National Science Foundation, the National Institute of Science and Technology, and the Office of Science at the Department of Energy.

The returns that we receive from our investments in these agencies far exceed the cost, whether it is fighting the war on terror abroad or at home, ending our dependence on foreign oil, or inspiring our children to enter high tech fields, so that the United States can continue to push the frontiers of innovation, these agencies have critical roles to play. I am especially pleased to see the Advanced Energy Initiative at the Department of Energy is funded at

\$2.7 billion in the fiscal year 2008 budget, a 26 percent increase over the fiscal year 2007 request.

As I have said on many occasions, America needs to be more energy independent, and federal programs such as these, combined with private sector initiatives, will help us achieve this goal. Whether we explore hydrogen fuel cells, cellulosic ethanol, clean coal technology, or advancements in oil and gas drilling, we are moving America away from a dependence on foreign oil and increasing our national competitiveness.

I am also pleased to see an increase over the fiscal year 2007 budget for the National Oceanic and Atmospheric Administration. NOAA provides valuable national services, including the weather forecasts and warnings that affect the daily lives of every citizen.

As for NASA, a 3.1 percent increase is good, but it still may not be sufficient to ensure that we meet the 2014 goal to launch the new Crew Exploration Vehicle. Mike Griffin is doing a great job at NASA, but the Administration must acknowledge that the budgets being provided to him are fostering additional delays in fielding the new Exploration Vehicle. I hope you can address my concerns that further reductions in exploration systems funding will jeopardize the transition from the Shuttle to the CEV.

I am hopeful our committee will continue to examine the effects of underfunding this very vital and important initiative, and I certainly look forward to your testimony, sir.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Thank you, Mr. Chairman. Good morning, Dr. Marburger. It's good to have you before us this morning.

I am sure that we are all in agreement that we are challenged with achieving a delicate balance between adequately funding our nation's priorities while at the same time exhibiting fiscal constraint in an effort to reduce the deficit and bring our budget under control. Likewise, I know we also are all in agreement that if we are to remain the world leader in competitiveness and innovation, we must make the appropriate investments in research, development, technology, and math and science education.

I am pleased to see that the FY 2008 Budget Request continues to build upon many elements of the President's American Competitiveness Initiative (ACI), particularly with regard to substantially increasing the funding for physical sciences and engineering at the National Science Foundation (NSF), the National Institute of Science and Technology (NIST), and the Office of Science at the Department of Energy (DOE). The returns that we receive from our investments in these agencies far exceed the costs. Whether it is fighting the war on terror abroad or at home, ending our dependence on foreign oil, or inspiring our children to enter high-tech fields so that the United States can continue to push the frontiers of innovation, these agencies have critical roles to play.

I am especially pleased to see that the Advanced Energy Initiative at the Department of Energy is funded at \$2.7 billion in the FY 2008 budget—a 26 percent increase over the FY 2007 request. As I have said on many occasions, America needs to be more energy independent and federal programs such as these, combined with private sector initiatives, will help us achieve this vital goal. Whether we explore hydrogen fuel cells, cellulosic ethanol, clean coal technology, or advancements in oil and gas drilling, we are moving America away from a dependence on foreign oil and increasing our national competitiveness.

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the budgets being provided to him are fostering additional delays in fielding the new Exploration Vehicle. I hope that you can address my concerns that further reductions in exploration systems funding will jeopardize the transition from the Shuttle to the CEV. I am hopeful our committee will continue to examine the effects of underfunding this vital initiative.

I look forward to your testimony.

Chairman GORDON. Dr. Marburger, if you will give us just a moment. We have got to do some Committee business before we start the hearing.

And pursuant to notice, the Committee will now consider for adoption the oversight plan for the 110th Congress. According to the Rules of the House, the Committee must adopt its oversight agenda in an open meeting of the Committee. You have before you the text of the oversight plan for the 110th. The text incorporates all suggestions, additions, and changes made at the request of the minority. I would also like to note that the adoption of this plan does not preclude oversight or investigation of additional matters as the need arises.

I now recognize Mr. Hall for any comments he might like to make.

Mr. HALL. Mr. Chairman, I will be brief. Thank you, and I appreciate the fact that you incorporated the suggested changes that we made, and appreciate your staff working with us the way they have, and I thank you for your help and accommodation on this issue.

And we are prepared to adopt this oversight agenda this morning. I think there will be no opposition from this side.

Chairman GORDON. Thank you, Mr. Hall. I hope this is an example of how we are going to work together in every way possible.

I thank the distinguished gentleman for his comments. The Chair will order the previous question, on the adoption of the oversight plan.

The question on adoption of the oversight plan for the 110th Congress. All those in favor say aye. Aye. Those opposed, say nay. In the opinion of the Chair, the ayes have it.

Okay. I ask unanimous consent that all additional opening statements submitted by the Committee Members be included in the record. Without objection, so ordered.

[The prepared statement of Mr. Costello follows:]

#### PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Good morning, Mr. Chairman, thank you for calling this hearing to consider the President's fiscal year 2008 (FY08) budget proposal for federal research and development (R&D) programs.

Energy security and investments in science, technology, and innovation are critical to our fight to stay competitive in the global marketplace and to develop clean energy technologies to meet our future energy needs. Adequate funding must be provided to meet these important goals, and I believe greater congressional oversight is needed to ensure government agencies are correctly implementing federal R&D programs.

The President's budget proposes \$143 billion in federal R&D funding which represents a slight increase over the anticipated FY07 level. First, the fossil energy R&D budget, which includes funding for coal programs, received \$557 million in FY08, a two percent increase compared to FY07. While the coal budget appears robust, a good portion of the funding for FY 2008 is derived from previously appropriated clean coal funds, including funding for FutureGen. Therefore, only \$15 million can be considered "new" funding for clean coal programs. I am opposed to the rescission of these funds and I will work with my colleagues on both sides of the

aisle to restore this funding. Coal is our most economical and abundant domestic resource, with a 250-year supply, and will be the mainstay for electricity generation into the foreseeable future. I believe Congress must continue to support a robust coal budget in order to improve coal use by supporting advancements in technology to reduce emissions of both criteria pollutants and carbon dioxide.

Further, within the President's proposed DOE budget, a slight funding increase is provided for the Carbon Sequestration Program to develop a portfolio of technologies that hold great potential to reduce greenhouse gas emissions. The State of Illinois is one of seven regional carbon sequestration research partners funded by the Department of Energy. To date, research has shown that the geology in the Illinois Basin is favorable for geological sequestration and pilot tests are needed to demonstrate efficiency and carry out safety evaluations of burying carbon dioxide underground. I am concerned that the President's budget proposal significantly decreases the number of small scale demonstrations planned for Phase III of the regional carbon sequestration partnership. For Illinois, verifying the safety and capacity of geological sequestration through the Partnership research is key to revitalizing our coal industry, implementing the most advanced coal gasification technology, and making economic and meaningful carbon dioxide emissions reductions.

Second, I am pleased the President's budget provides \$9 billion in loan guarantees for clean energy and innovative technologies authorized in Title 17 of the *Energy Policy Act of 2005* (EPACT). This is a step in the right direction, but a much bigger step is needed to make a real difference in the development of clean energy technologies. When Congress created this loan guarantee program in EPACT 2005, we envisioned a significantly more ambitious scope for the loan guarantees. This program provides incentives for clean energy projects that are critical in the fight against pollution or global emissions of greenhouse gases. Implementation of this program at the scale envisioned in EPACT 2005 could be a significant step toward addressing the challenge of global climate change, with little or no cost to the federal treasury.

Third, the Bush administration's "American Competitiveness Initiative" as part of the Office of Science represents an increase of \$602 million, or 15.9 percent over the FY07. To build on our successes and remain a leader in science and technology, our federal policies must elevate and promote new levels of educational achievement and focus on efforts to produce a skilled and knowledgeable workforce. With the right policies and adequate funding support, we will maintain America's competitive edge, we will create more jobs, and will improve the quality of life and standard of living for generations to come.

Finally, I am concerned that the single best government program to provide immediate help to U.S. manufacturers, the Manufacturing Extension Program (MEP), is severely cut again this year. MEP is the only federal program with a proven track record in creating and retaining manufacturing jobs; yet, the Administration proposes to cut MEP by 56 percent. Annually, the Illinois Manufacturing Extension Center (IMEC) provides assistance to about 450 small and mid-sized manufacturers. These companies reported an average cost savings of \$179,000 with IMEC's assistance. Year after year, MEP Centers struggle to survive rather than focus on what they do best: helping businesses increase efficiency and productivity in order to be competitive in the global marketplace.

I welcome our witness and look forward to his testimony.

[The prepared statement of Mr. Carnahan follows:]

#### PREPARED STATEMENT OF REPRESENTATIVE RUSS CARNAHAN

Mr. Chairman, thank you for holding today's hearing on the President's proposed research and development budget.

I share the Chairman's opinion that there are various positive increases in the R&D budget in the areas of competitiveness and innovation, specifically in basic research in the Department of Energy and the National Science Foundation. At the same time, other necessary programs have received decreased funding to account for these adjustments.

I am particularly concerned about proposed cuts in some of the Nation's energy efficiency and renewable energy programs. We owe it to our children to invest in energy research now so that we can develop needed technologies to increase competitiveness and decrease the affects of pollution on global warming in the future.

I am pleased that the Chairman has again put forward his innovation package and believe its consideration will allow this committee to more appropriately allocate funding to address concerns about U.S. competitiveness. The St. Louis commu-

nity was delighted to host Mr. Gordon for a panel discussion on innovation last August. I look forward to participating actively in future debate.

I look forward to hearing your testimony, Dr. Marburger. Thank you very much for being here today.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Dr. Marburger, thank you for coming today. I look forward to your testimony.

Unfortunately, America is struggling to keep pace with the international community in technological advances. To win this race and remain a technological leader, we must focus more attention on students and investment in research and development. If we don't invest now and invest well, we will fall even further behind.

ASU has a large presence in my district and is a prominent leader in this fight to maintain global competitiveness. That is why I am pleased to see that the President's proposed budget includes an increase for NASA and the National Science Foundation (NSF) above the Fiscal Year 2007 levels. Both agencies fund the university through contracts and grants.

While I am pleased with to see this funding increase, I am concerned about some of the President's funding priorities.

Investing in short- and long-term research and development today is a dual benefit. For example, improving technologies for energy efficiency and vehicle emissions benefits both the environment and the economy.

As such funding should be well-targeted to meet not only current needs but future research and development projects.

The federal budget proposal which we are hearing about today highlights a lack of commitment by our government to dedicate itself to this goal.

The future of American leadership in science and technology is heavily dependent on ensuring the competitiveness future generations. As a retired teacher with 28 years of experience, I understand the importance of education. For this reason, the FY 2008 budget's proposed overall cuts to K-12 education are particularly alarming.

It seems like the Administration has saved us some money now, but cuts made to lower education programs are going to cost us in the global economy down the road.

Therefore a focus on long term research and development must be a priority. If we don't step up our commitment, we will lose the opportunity to compete in critical technologies. To maintain America's competitiveness in science and technology, we must keep up investment and, more importantly, encourage future leaders in the field.

I hope this committee. . .a distinguished committee. . .with a long tradition of fairness and bipartisanship. . .will address this at the appropriate time.

[The prepared statement of Mr. Ehlers follows:]

PREPARED STATEMENT OF REPRESENTATIVE VERNON J. EHLERS

I am pleased that Dr. Marburger is with us today to share the Administration's request for research and development in the FY08 budget. I know that there are many competing national priorities, including securing the homeland, providing for our aging population, and maintaining a vibrant national economy.

For the past several years, research and development funding for defense, weapons development and national security has increased while other areas of federal research and development, especially basic research in the physical sciences, has remained flat or declined in real terms. Last year's FY 2007 request sought to reverse this trend, and House appropriators supported the increases requested by the Administration for three important agencies: the National Science Foundation, the Department of Energy's Office of Science, and the National Institute of Standards and Technology. I am thankful that the requests for the "American Competitiveness Initiative" are continued in FY08, and I look forward to working with my colleagues on the authorizing and appropriating committees to make the funding levels requested a reality.

While I am heartened by the requested funds for NSF, I am concerned about the status of the Education and Human Resources (EHR) budget at the Foundation, including the Math and Science Partnership program. There is a continuing, but distressing, trend for NSF to move away from its K-12 educational mission and to focus solely on graduate education and activities to broaden participation in science, technology, engineering and math (STEM) fields. For the first time in years the Math and Science Partnership program will potentially be able to make some new

grants this year instead of being eliminated as in recent budgets. With more than 50 years of experience, decreasing the role of NSF in education seems shortsighted when we are currently facing the challenge of adequately preparing our students to enter science and technology fields.

[The prepared statement of Mr. Neugebauer follows:]

PREPARED STATEMENT OF REPRESENTATIVE RANDY NEUGEBAUER

Mr. Chairman:

Thank you for holding this hearing. I welcome the opportunity to take part in this important discussion and look forward to hearing from Dr. Marburger.

President Bush's budget proposal represents a good starting point for Congress as we begin to set funding priorities for 2008. I think we all realize the value of scientific research and funding and how it directly impacts Americans. Continued scientific research and development gives our troops the tools to have the necessary technology to more safely fight the War on Terror, protects Americans' security here at home, provides the opportunity to help reduce our dependence on foreign sources of energy, and improves everyday conveniences such as reliable weather forecasting.

Given this, we are also on target to balance the budget. It is imperative that we keep pursuing this goal by limiting unnecessary spending and continue to provide tax relief that has allowed our economy to thrive. We must be responsible stewards of the taxpayers' money and ensure that money is not spent in a wasteful manner. We in Congress have a responsibility to show spending restraint and make sure that federal money is used in a responsible and efficient manner.

I welcome the opportunity to work with the Administration and my colleagues on the Science Committee to achieve our common goal of scientific advancement while also being fiscally responsible.

Chairman GORDON. And now, Mr. Marburger, thank you. We are pleased that you have joined us as the Science Advisor to the President and Director of the Office of Science and Technology Policy. Before his appointment to the Executive Office of the President, Dr. Marburger served in a very distinguished way as the Director of the Brookhaven National Laboratory, and as President of the State University of New York at Stony Brook.

Dr. Marburger, we greatly appreciate you adjusting your schedule in order to be with us today.

**STATEMENT OF DR. JOHN H. MARBURGER, III, DIRECTOR,  
OFFICE OF SCIENCE AND TECHNOLOGY POLICY**

Dr. MARBURGER. Thank you, sir, and it is a great pleasure for me to be here. Chairman Gordon and Ranking Republican Member Hall, and Members of the Committee, I am very pleased to appear today to present the President's Fiscal Year 2008 Research Development Budget.

This committee has been a strong and reliable supporter of the Nation's science mission, and on behalf of the Administration, I thank the Committee for the good working relationship it has established with the science agencies and with my office, and I look forward to working together in the future to advance American innovation and competitiveness. I very much appreciate the opportunity to make these points.

I have submitted an extensive written testimony that I ask be included in the record, and I will briefly present some of the themes of that statement.

President Bush's determination to balance the federal budget in five years requires setting priorities and allocating resources to achieve the greatest impact. Winning the war on terror, securing the homeland, and strengthening the economy remain the Presi-

dent's top priorities, and this year's budget once again emphasizes investments in America's future competitiveness through research and development.

The President is proposing a record \$142.7 billion R&D budget, which is an increase of \$5.5 billion over the 2007 budget. While the non-defense discretionary budget grows by less than a percent relative to the 2007 levels in the current continuing resolution, non-defense R&D is increased by 4.25 percent, or nearly seven times faster. While significant increases have occurred for defense-related development, most of the D in R&D, I do want to emphasize that non-defense research spending has grown significantly during this Administration, as shown in the chart that I have placed—my able assistant has placed before you.

With the 2008 budget, real growth (that is, not taking inflation into account) in outlays for the non-defense R&D budget is up 26.5 percent in seven years during this Administration. As you know, President Bush has advanced a strong agenda for science and technology in his recent State of the Union messages. Last year's American Competitiveness and Advanced Energy Initiatives, and this year's discussion of the importance of research and development to our future energy independence define priorities in research and development, science and math education, and other technology themes that are reflected in this year's R&D budget request.

One of those themes is an emphasis on basic research, which receives almost \$1 billion above the last appropriated level of 2006. That is \$28.4 billion compared with \$27.5 billion. This favorable treatment of basic research is occurring in a year of belt-tightening for many other domestic programs, indicating the high priority this administration places on the importance of this activity.

The broader category known as the federal science and technology budget, which goes beyond basic research to capture other activities relevant to competitiveness, advances by \$1.3 billion in 2008 relative to fiscal year 2006 levels. And when only civilian S&T agencies are considered, that represents a 4 percent increase. If Congress funds the President's 2008 request, and avoids earmarking this category, the FS&T funds, federal science and technology funds available for science agency programs, will increase by \$1.5 billion from the President's own 2007 budget request.

The American Competitiveness Initiative remains an important part of this year's R&D budget request. As you know, the ACI identifies three priority science agencies that have already been mentioned in opening statements, the National Science Foundation, the Department of Energy's Office of Science, and the laboratories of the National Institutes of Standards and Technologies. The 2008 budget calls for a 7.2 percent increase on top of 2007's 9.3 percent requested increase. This additional \$764 million brings the total two year ACI research incremental investment to \$2.6 billion additional funding.

Mr. Chairman, as I prepared this testimony, the then-current draft of the Fiscal Year 2007 continuing budget resolution, the CR, provides only about half of the first year ACI budget, about \$452 million short. I think the chart shows \$454, but it is actually \$452 million short of the President's request, and I know this committee is as disappointed as I am at this shortfall for science, and if not

corrected before completion of the fiscal year '07 process, which I am afraid is nearing completion now, a year of enhanced and expanded high impact innovation research will be lost, and a \$1.2 billion increase would be required in 2008 to catch up to the President's commitment. I think this would be a difficult 12 percent increase in 2008.

Well, in the past, the management of science programs has been made more difficult by the practice of earmarking. I know this committee already fully appreciates the earmarking problem and supports best practices in the allocation of research funding. As we discuss the importance of pursuing the best science to contribute to U.S. competitiveness, I hope the Congress will eliminate research earmarks in the fiscal year '08 appropriations process, as it is so commendably doing in a spirit of reform for the current fiscal year.

Other important areas of research increased or sustained in this budget include climate-related science and technology, environmental systems, Earth observation systems, the Advanced Energy Initiative. I know my time is up, but I would direct your attention to my written testimony for detailed statements of these areas, and also, of the detailed agency budgets under the purview of this committee.

Before I conclude this very brief and incomplete summary of the large and complex R&D budget, I do want to flag a concern regarding NASA and the budget danger that lies ahead for this agency, already flagged by Ranking Member Hall. The President's budget includes a 3.1 percent increase for NASA, on top of a 3.4 percent requested increase for '07. However, the 2007 full year continuing resolution, as it stands now, cuts NASA by more than a half a billion dollars from the President's request, which leaves NASA at its '06 level, with no increase, and puts at risk the *Vision for Space Exploration* and priority Earth and space science missions.

Mr. Chairman, America continues to lead the world in the quality and quantity of the science it produces. We lead not only in science, but also in translating science to economically significant products that enhance the quality of life for all people. This budget will sustain this leadership, and maintain science and technology capabilities that are the envy of the world, and I ask that Congress fully fund the initiatives advanced in the President's proposal.

Thank you for permitting me to make these statements.

[The prepared statement of Dr. Marburger follows:]

#### PREPARED STATEMENT OF JOHN H. MARBURGER, III

Chairman Gordon, Ranking Republican Member Hall, and Members of the Committee, I am pleased to appear before you today to present the President's Fiscal Year 2008 research and development (R&D) budget. Although this is my sixth year coming before the Committee to discuss the President's R&D program, it is my first under the new Congressional leadership. I am aware that this committee has expressed bipartisan support for science funding in the past, and values scientific research and its applications for the benefits it brings to every part of our society. On behalf of the Administration, I thank the Committee for the good working relationship it has established with the science agencies and with my office, and look forward to working together in the future to advance American innovation and competitiveness.

This year, President Bush presents a Federal Budget that will balance in five years. The President proposes to do this by continuing strong pro-growth economic policies and by holding non-security discretionary spending below inflation. This strategy inevitably requires establishing priorities and allocating resources to

achieve the greatest impact. Winning the war on terror, securing the homeland and strengthening the economy remain the President's top priorities, and this year's budget once again emphasizes investments in America's future competitiveness through research and development. The President is proposing a record \$142.7 billion 2008 Federal R&D Budget, an increase of \$5.5 billion over the 2007 Budget. And while the overall 2008 non-defense discretionary budget grows by on 0.65 percent relative to the 2007 levels in the current continuing resolution, non-defense R&D is increased by 4.26 percent, or almost seven times faster. The President's commitment to the government's R&D enterprise is strong, and the advancement of science remains among his top budget priorities.

While significant increases have occurred for defense-related development—most of the “D” in R&D—it is important to be aware of the very significant growth during this Administration in non-defense research spending, as shown in an accompanying chart. Non-defense R&D has continued on a significantly upward trajectory. In fact, with President Bush's 2008 Budget, *real* growth in outlays for the conduct of non-defense R&D—i.e., corrected for inflation—is up 26.5 percent in seven years during this Administration.

With the launch of the American Competitiveness Initiative (ACI) last year and further discussion of the importance of research and development to our future energy independence this year, President Bush's recent State of the Union addresses advance a strong agenda for science and technology. This focus on research and development, science and math education, and other technology themes directly supports our national goals of securing the Nation, protecting the homeland, and making the economy strong.

Before I get into the specifics of this year's research budget, I want to express my concern about the very serious deleterious impacts of earmarking on the science budget. I do this knowing that this committee already fully appreciates the problem and supports best practices in the allocation of research funding. As we discuss the importance of pursuing the best science to contribute to U.S. competitiveness, I hope the Congress will eliminate research earmarks in the FY 2008 appropriations process, as it is so commendably doing in a spirit of reform for the current fiscal year.

The 2008 Budget raises funding for the category of Basic Research almost \$1 billion above the last appropriated level of 2006: \$28.4 billion compared with \$27.5 billion. Since the effect of last year's earmarks only enhance this difference and make the real programmatic increases even bigger, in my view this is a direct indication of the Administration's strong focus on fundamental research and the discovery of new knowledge as a leading mission of the Federal Government. It is notable that this favorable treatment of Basic Research is occurring in a year of belt-tightening for many other domestic programs, indicating the high priority this Administration places on the importance of this activity.

Basic Research is not the complete measure of investment activities that drive future innovation. The accounting category known as the Federal Science and Technology Budget emphasizes both basic and applied science and engineering research short of development, and thus captures other important activities relevant to competitiveness. This category advances \$1.3 billion in 2008 relative to FY 2006 levels, and when only civilian S&T agencies are considered, that represents a four percent increase. If Congress funds the President's 2008 request and avoids earmarking, FS&T funds available for science agency programs will increase \$1.5 billion from the President's own 2007 Budget.

As the next now-familiar chart displays, the American Competitiveness Initiative identifies three priority science agencies: the National Science Foundation; DOE's Office of Science; and the laboratories of the National Institute of Standards and Technology. The 2008 Budget calls for a 7.2 percent increase on top of 2007's 9.3 percent requested increase. This additional \$764 million brings the total two-year ACI Research incremental investment to \$2.6 billion.

As I prepared this testimony, the then-current draft of the FY 2007 Continuing Budget Resolution (CR) provides only 50 percent of the first-year ACI budget. As you can see on this table, that is \$452 million short of the President's request. I know this committee is as disappointed as I am at this shortfall for science. The Statement of Administration Policy on the continuing resolution makes clear this is not sufficient to meet America's competitiveness challenge, and falls short of the doubling path that is an important component of the Initiative. If not corrected before completion of the FY 2007 process, a year of enhanced and expanded high-impact innovation research will be lost and a \$1.2 billion increase would be required in 2008 to “catch-up” to the President's commitment. This would require a difficult 12 percent increase in 2008.

While future competitiveness is the featured priority goal in this science budget, other science areas remain important to our nation's goals. Since 2002, the Adminis-

tration has spent approximately \$9 billion on climate change science research through the multi-agency Climate Change Science Program, and the President's 2008 Budget sustains the level of effort. Further, between 2003 and 2006, the President has committed nearly \$3 billion annually to the climate change technology research and deployment programs that constitute the multi-agency Climate Technology Program. The U.S. leads the world in advancing climate science and technology, with expenditures of nearly \$29 billion in climate-related science, technology, international assistance, and incentive programs during this Administration.

Undoubtedly previous investments in energy-related science and technology have put the U.S. well on track to meet the President's goal of reducing greenhouse gas intensity 18 percent by 2012. In other programs relevant to the environment, the 2008 Budget includes funding for a number of related Earth Observations programs including ocean observing systems, earthquake monitoring and prediction, tsunami warnings, Landsat, and the Global Precipitation Measurement mission. This year's budget also includes a new Ocean Initiative with over \$80 million in new 2008 funding for ocean science and research at the National Oceanic and Atmospheric Administration, NSF and the U.S. Geological Survey.

Biomedical research is supported in the 2008 NIH Budget with an increase of \$431 million over the 2007 request. This will allow NIH to award over 10,000 new and competing research grants, an increase of more than 900, and will double the New Investigators program. The NIH Director's Roadmap Initiative is increased 10 percent in 2008 to enhance this interdisciplinary incubator for new ideas that will accelerate the pace of discovery across the NIH's 27 Institutes and Centers.

The Advanced Energy Initiative (AEI) at DOE is funded at \$2.7 billion in the 2008 Budget, which is a 26 percent increase over the President's 2007 request and almost \$1 billion more than 2006. The AEI will contribute to the President's goal of cutting gasoline use by 20 percent in 10 years by accelerating the technical and cost viability of plug-in hybrids, hydrogen-powered fuel cells, and "cellulosic" ethanol derived from biomass. AEI will also accelerate clean electricity generation technologies such as solar, wind, nuclear, and clean coal. Perhaps most critically, the 2008 AEI includes over \$700 million in basic research at DOE's Office of Science, a 32 percent increase, to overcome major technical barriers to the use of solar, biomass, hydrogen and fusion. With the 2008 Budget, the Presidential commitment to invest \$2 billion on clean coal research is fulfilled, as is President Bush's commitment to propose a five-year, \$1.2 billion Hydrogen Fuel Initiative.

This Administration's National Nanotechnology Initiative also strongly continues with \$1.45 billion in 2008 for this multi-agency, well-coordinated investment in fundamental research, multi-disciplinary centers of excellence, and development of focused cutting-edge research and education infrastructure. With the 2008 request, over \$8 billion will have been spent on nanoscale R&D in seven years. The NNI also supports activities addressing the societal implications of nanotechnology, including those related to human and environmental health and methods for managing potential risks.

Finally, let me finish by expressing a concern regarding NASA and the budget danger that lies ahead for this agency. The President's FY 2008 Budget includes a 3.1 percent increase for NASA in 2008 on top of the President's 3.4 percent requested increase for 2007. However, the 2007 full-year CR as it stands now cuts NASA \$545 million from the President's request. That leaves NASA at its 2006 level with no increase and puts at risk the *Vision for Space Exploration* and priority Earth and space science missions. Certainly at risk is the timely development of a new, much more capable U.S. human spacecraft to follow the Shuttle which will be retired in 2010.

#### **AGENCY BUDGET HIGHLIGHTS**

##### *National Science Foundation (NSF):*

Funds are requested to increase the budget for NSF to \$6.43 billion in FY 2008, 45 percent above 2001's \$4.43 billion level. Similar investments in the past have yielded important scientific discoveries, which boost economic growth and enhance Americans' quality of life.

The centerpiece of the American Competitiveness Initiative is President Bush's plan to double investment over a 10-year period in key federal agencies that support basic research programs emphasizing the physical sciences and engineering. NSF is one of the three key agencies, as it is the primary source of support for university and academic research in the physical sciences, funding potentially transformative basic research in areas such as nanotechnology, advanced networking and information technology, physics, chemistry, material sciences, mathematics and engineering.

NSF has central roles in two previously mentioned Administration priority research areas that promise to strengthen the Nation's economy: the National

Nanotechnology Initiative (NNI) and the Networking and Information Technology R&D program (NITRD). NSF-funded nanotechnology research, proposed at \$390 million in FY 2008, a five percent increase over the 2007 request and 160 percent since 2001, has advanced our understanding of materials at the molecular level and has provided insights into how innovative mechanisms and tools can be built atom by atom. This emerging field holds promise for a broad range of developing technologies, including higher-performance materials, more efficient manufacturing processes, higher-capacity computer storage, and microscopic biomedical instruments and mechanisms. NSF's investments in NITRD, funded at \$994 million in 2008, up \$90 million over 2007 and 56 percent since 2001, support all major areas of basic information technology (IT) research. NSF also incorporates IT advances into its scientific and engineering applications, supports using computing and networking infrastructure for research, and contributes to IT-related education for scientists, engineers, and the IT workforce.

The 2008 NSF Education and Human Resources (EHR) budget will continue efforts to prepare U.S. students for the science and engineering workforce with a 7.5 percent increase (+\$53 million) over the level in the House-passed 2007 full-year CR, adjusted for the movement of EPSCoR to the Research and Related Activities account. To further strengthen NSF's emphasis on increasing the quality and quantity of the science and engineering workforce and ensuring that undergraduate students are well prepared for an increasingly technological global society, EHR will increase funding for its undergraduate education portfolio by \$13.4 million. This total includes \$3.5 million for the Course, Curriculum, and Laboratory Improvement program and \$5.1 million for the Advanced Technological Education program to improve technician training at community colleges. The FY 2008 EHR budget also provides an increase of \$8.9 million for the Graduate Research Fellowship program, an amount that will support an additional 200 graduate students, and \$4.53 million for the Centers of Research Excellence in Science and Technology, a program designed to broaden participation in the science and engineering workforce. NSF's K-12 education programs remain strong with \$30 million made available in FY 2008 for new awards under the Math and Science Partnerships program.

*Department of Energy (DOE):*

DOE implements the President's Advanced Energy Initiative (AEI), highlighted above. The 2008 AEI Budget proposes:

- \$217 million for the solar R&D to accelerate development of cost-effective photovoltaic materials;
- \$292 million for the biomass R&D, including \$179 million for the Biofuels Initiative and an additional \$113 million in supporting basic research, to help enable cellulosic ethanol to become practical and competitive;
- \$42 million for development of high-energy, high-power batteries for hybrid-electric and "plug-in" hybrid vehicles;
- \$309 million for the Hydrogen Fuel Initiative to accelerate development of hydrogen production, storage, and infrastructure technologies that can help make possible the use of hydrogen-powered fuel cell vehicles and infrastructure to support them;
- \$40 million for wind energy research to help improve the efficiency and lower the costs of wind technologies for use in low-speed wind environments, and to help overcome technical and regulatory barriers to more wide-scale deployment of wind technologies; and
- \$108 million for the FutureGen Initiative to develop technologies for a coal gasification plant with near-zero atmospheric emissions.

The 2008 AEI budget also proposes \$395 million for the Global Nuclear Energy Partnership in Nuclear Energy with the goals to demonstrate advanced fuel cycle technologies, to expand the domestic use of nuclear power, and to provide for safe, environmentally responsible global nuclear energy systems that support non-proliferation objectives. Full funding of \$160 million for the U.S. contribution to the ITER international fusion energy project is included as well.

The Office of Science in DOE (DOE-SC) is one of the three priority research agencies in the President's American Competitiveness Initiative, supporting scientific studies and infrastructure for a wide range of basic research related to potentially significant innovations. The 2008 Budget provides \$4.4 billion for DOE-SC, an increase of 16 percent over the level in the 2007 House-passed full-year continuing resolution (CR), which is \$306 million below the President's 2007 AEI request. The Budget includes funding for priorities such as nanotechnology (\$286 million), materials science research facilities (\$699 million), basic research in support of the hy-

drogen fuel initiative (\$60 million), the advanced energy initiative (\$713 million), and high-end computing facilities and research (\$340 million). The Budget also completes funding (\$45 million) for project and engineering design of the National Synchrotron Light Source II, a new x-ray light source that will enable the study of materials properties and functions at a level of detail and precision (nanoscale) never before possible. It continues support for construction of the Linac Coherent Light Source—a materials research facility that will provide laser-like x-rays allowing an unprecedented real-time glimpse of chemical and biological processes, fully funds operations for the five nanoscale science research centers, and provides funding for the project and engineering design for the upgrade of the Continuous Electron Beam Accelerator Facility.

*National Institute of Standards and Technology (NIST):*

The Department of Commerce's NIST "core" research and facilities receive \$594 million in 2008, an increase of 21 percent from the level in the 2007 House-passed full-year CR, which is \$44 million below the President's 2007 ACI request. In 2008, the American Competitiveness Initiative proposes NIST funding increases of \$69 million for new initiatives in research and measurements in high-leverage areas such as the Disaster-Resilient Structures and Communities Program, the interagency Climate Change Science Program, and the interagency National Earthquake Hazards Reduction Program. Support continues for high-leverage, broad impact research in quantum information processing, nanotechnology, and new and expanded capabilities at the NIST Center for Neutron Research and at its Boulder, Colorado, high-performance labs.

*National Aeronautics and Space Administration (NASA):*

The President's 2008 Budget for NASA is \$17.3 billion, a 3.1 percent increase over the President's 2007 request, reflecting a strong commitment by the Administration to the continued pursuit of the *Vision for Space Exploration*. The 2007 House-passed full-year CR, however, reduces the 2007 Budget by \$545 million to \$16.2 billion. If NASA is not provided its 2007 request level of \$16.8 billion, the agency needs flexibility within its appropriation accounts to reduce the adverse consequences of a top-line reduction.

In 2008, NASA requests \$3.92 billion for exploration systems including the Orion Crew Exploration Vehicle (CEV) and the Ares I launch vehicle that will carry astronauts to the Moon. Having already initiated the acquisition process for certain elements of this architecture during 2006, NASA anticipates that all Orion CEV and Ares I elements will be under contract by the end of 2007, with the first crewed-flight planned to occur no later than 2014.

The 2008 Budget requests \$5.52 billion, almost a third of NASA's total budget, to continue operating the 59 spacecraft of NASA's Science Mission Directorate and to support investments in future Earth and space science missions, vital technologies, and frontier research. NASA will develop seven new Earth-observing space missions, including the Landsat Data Continuity Mission and the Global Precipitation Measurement mission, which will launch no later than 2013. NASA will continue its roles in the interagency Climate Change Science Program and the international initiative on the Global Earth Observing System of Systems. NASA will also support studies of the Earth-Sun system using data from the STEREO mission and the upcoming Solar Dynamics Observatory. A new Lunar Science Research program will leverage robotic investigations of the lunar surface in support of the *Vision for Space Exploration*. Following up its missions to Mars and Saturn, NASA is sending ever-more capable spacecraft to Mars, Mercury, the asteroids, and Pluto. NASA also will continue its vibrant astronomy program through its Great Observatories, and will upgrade Hubble in 2008 to provide five more years of productive on-orbit life, while planning new spacecraft, such as Webb and Kepler, that will search for planets around other stars and peer deep into the universe. Funding for the Beyond Einstein program is increased in FY 2008 to act on the forthcoming recommendation from the National Research Council regarding a strategy to unlock the secrets of the fundamental physics of the universe.

In December 2006, the President approved the Nation's first National Aeronautics R&D Policy. Consistent with this Policy, the 2008 NASA aeronautics budget prioritizes fundamental aeronautics research, the improvement of aviation safety, and research that will help support the development of the Next Generation Air Transportation System. In addition, NASA will address infrastructure upgrades and maintenance requirements for aeronautical test facilities across NASA centers that are of vital importance to the Nation. The 2008 Budget requests \$554 million for NASA aeronautics, an almost five percent increase over the 2007 request after adjusting for NASA's implementation of simplified full-cost accounting.

*National Oceanic and Atmospheric Administration (NOAA):*

For NOAA in the Department of Commerce, the FY 2008 Budget provides \$358 million for Oceanic and Atmospheric Research (OAR), a \$20 million increase over the 2007 Budget. OAR provides for ongoing research on climate, weather, air quality, and ocean processes.

The 2008 NOAA budget supports a new interagency oceans initiative to implement the President's U.S. Ocean Action Plan including \$60 million in new funding over the 2007 Budget to advance oceans science and research (of which \$13 million is in OAR). \$20 million will address four near-term ocean research priorities established by the *Ocean Research Priorities Plan and Implementation Strategy* (ORPPIS), published in January (with another \$20 million from NSF and USGS). The NOAA Budget also proposes \$8 million to develop an operational ocean monitoring network, for technology and other infrastructure to support ocean science, for International Polar Year activities, and for research on protected species and commercial fisheries.

*United States Geological Survey (USGS):*

The President has proposed a budget of \$975.0 million for USGS in the Department of the Interior in Fiscal Year 2008. The proposed budget includes an increase of \$3 million for the new oceans initiative activities, including \$1.5 million in the Coastal and Marine Geology program to begin implementation of the Oceans Research Priorities Plan and Implementation Strategy. This involves conducting observations, research, and sea-floor mapping and developing forecast models. The budget also includes \$1.5 million in the Hydrologic Networks and Analysis program to begin implementation of an interagency National Water Quality Monitoring Network that will integrate watershed, coastal waters, and ocean monitoring based on common criteria.

The FY 2008 USGS budget continues funding for operations and maintenance of Landsats 5 and 7. The Budget also funds efforts with NASA and the Landsat Science Team to continue development of the Landsat Data Continuity Mission. The FY 2008 budget includes \$24 million for Landsat 8.

*Environmental Protection Agency (EPA):*

The FY 2008 Budget for science and technology funding at EPA is \$755 million. Research priorities include supporting the agency's risk assessment programs including Air Quality Science Assessments (formerly called the Air Quality Criteria Documents) and the Integrated Risk Information System (IRIS), and the Science to Achieve Results (STAR) program of extramural research and graduate fellowships in areas of environmental science and engineering. \$69 million is requested to fund new and ongoing research in water security, including monitoring and surveillance of terrorist threat agents, and post-incident decontamination.

*Department of Transportation (DOT):*

The FY 2008 Budget request for highway-related research is \$430 million, consistent with the level in the multi-year surface transportation research authorization. Highway research includes the Federal Highway Administration's transportation research and technology contract programs. These research programs include the investigation of ways to improve safety, reduce congestion, improve mobility, reduce life cycle construction and maintenance costs, improve the durability and longevity of highway pavements and structures, enhance the cost-effectiveness of highway infrastructure investments, and minimize negative impacts on the natural and human environment.

The 2008 Budget request for Federal Aviation Administration (FAA) Research, Engineering, and Development is \$140 million, including \$63 million focused on the advancement of the Next Generation Air Transportation System led by its Joint Planning and Development Office.

In addition, the 2008 Budget requests \$12 million for the Research and Innovative Technology Administration to coordinate and advance the pursuit of transportation research that cuts across all modes of transportation, such as hydrogen fuels, global positioning and remote sensing. DOT research programs also support the National Nanotechnology Initiative, the U.S. Climate Change Technology Program, and the President's Hydrogen Fuel Initiative.

*Department of Defense (DOD):*

DOD's FY 2008 R&D budget is almost \$79 billion. This level of funding will support the Department's commitment to transform its capabilities and forces for greater agility, while enabling effective responses to asymmetric and uncertain challenges of future conflicts.

These funds will also help address emergent threats through countermeasures to biological agents and will advance novel technologies to detect and neutralize improvised explosive devices, mines, rockets and mortars. DOD provides the largest share of NITRD program funding, over \$1 billion, to address IT needs for the Nation's defense. Likewise, DOD invests \$375 million under the National Nanotechnology Initiative, emphasizing development of materials, devices and systems that address the national security mission.

The Science and Technology (S&T) component of the overall DOD R&D budget includes basic research (6.1), applied research (6.2), and advanced technology development (6.3). At \$10.8 billion in the FY 2008 Budget, DOD S&T exceeds the 2001 enacted level by 21 percent, or \$1.8 billion. From 2000 to 2007, Congressional adds to DOD S&T quadrupled. For 2007, there were over 1200 of these adds (totaling \$2.8 billion), most of which must be identified and tracked down, advertised in a way specific to the Congressional mark, evaluated, negotiated and awarded, in some way separate from other potential awards. This means that those awards consume several times the staff and management resources of the average research award, and may not even target a military-specific research need. The large number of such additions creates impediments to the creation of effective research programs throughout the Department, and should be cause for concern to Congress as well as to the Administration.

A total of \$1.43 billion is provided for DOD 6.1 basic research in 2008. This is a nominal increase over the 2007 Budget and represents 13.3 percent of the DOD S&T Budget, more than last year's 12.8 percent share.

*Department of Homeland Security (DHS):*

The President's FY 2008 request includes \$799 million for the DHS Directorate of Science and Technology and \$562 million for the Domestic Nuclear Detection Office. R&D continues to play a key role in securing the Nation against the terrorist threat. The President's 2008 Budget maintains an aggressive investment in scientific research, technology development, and research infrastructure aimed at continuing to enhance our nation's security. Priority research areas include: \$100 million in transformational R&D aimed at enhancing our ability to detect, identify, and attribute nuclear and radiological materials; \$68 million for explosives countermeasures research; and \$15 million to fund cyber security and information assurance R&D.

## CONCLUSION

Making choices is difficult even when budgets are generous, but tight budgets require priorities to be focused, and program management to be strengthened. This year's R&D budget proposal provides robust levels of investment that allow America to maintain its leadership position in science and move ahead in selected priority areas. The American Competitiveness Initiative and Advanced Energy Initiative properly focus R&D investments in areas that will increase our economic competitiveness, decrease our dependence on foreign oil, and accelerate development of clean energy technologies.

America currently spends one and a half times as much on federally-funded research and development as Europe, and three times as much as Japan, the next largest investor. Our scientists collectively have the best laboratories in the world, the most extensive infrastructure supporting research, the greatest opportunities to pursue novel lines of investigation, and the most freedom to turn their discoveries into profitable ventures if they are inclined to do so.

We lead not only in science, but also in translating science to economically significant products that enhance the quality of life for all people.

This budget will sustain this leadership and maintain science and technology capabilities that are the envy of the world. I ask that Congress fully fund the initiatives advanced in the President's proposal. I would be pleased to respond to questions.

## BIOGRAPHY FOR JOHN H. MARBURGER, III

John H. Marburger, III, Science Adviser to the President and Director of the Office of Science and Technology Policy, was born on Staten Island, N.Y., grew up in Maryland near Washington D.C. and attended Princeton University (B.A., Physics 1962) and Stanford University (Ph.D. Applied Physics 1967). Before his appointment in the Executive Office of the President, he served as Director of Brookhaven National Laboratory from 1998, and as the third President of the State University of New York at Stony Brook (1980–1994). He came to Long Island in 1980 from the University of Southern California where he had been a Professor of Physics and

Electrical Engineering, serving as Physics Department Chairman and Dean of the College of Letters, Arts and Sciences in the 1970's. In the fall of 1994 he returned to the faculty, at Stony Brook, teaching and doing research in optical science as a University Professor. Three years later he became President of Brookhaven Science Associates, a partnership between the university and Battelle Memorial Institute that competed for and won the contract to operate Brookhaven National Laboratory.

While at the University of Southern California, Marburger contributed to the rapidly growing field of nonlinear optics, a subject created by the invention of the laser in 1960. He developed theory for various laser phenomena and was a co-founder of the University of Southern California's Center for Laser Studies. His teaching activities included "Frontiers of Electronics," a series of educational programs on CBS television.

Marburger's presidency at Stony Brook coincided with the opening and growth of University Hospital and the development of the biological sciences as a major strength of the university. During the 1980's federally sponsored scientific research at Stony Brook grew to exceed that of any other public university in the northeastern United States.

During his presidency, Marburger served on numerous boards and committees, including chairmanship of the governor's commission on the Shoreham Nuclear Power facility, and chairmanship of the 80 campus "Universities Research Association" which operates Fermi National Accelerator Laboratory near Chicago. He served as a trustee of Princeton University and many other organizations. He also chaired the highly successful 1991/92 Long Island United Way campaign.

As a public spirited scientist-administrator, Marburger has served local, State and Federal governments in a variety of capacities. He is credited with bringing an open, reasoned approach to contentious issues where science intersects with the needs and concerns of society. His strong leadership of Brookhaven National Laboratory following a series of environmental and management crises is widely acknowledged to have won back the confidence and support of the community while preserving the Laboratory's record of outstanding science.

## DISCUSSION

Chairman GORDON. Thank you, Mr. Marburger.

I hope you don't think that I am a one trick pony, because I think every time we have talked in the last year or probably year and a half, I have gone back to the competitiveness, and the *Rising Above the Gathering Storm* report, which Norm Augustine will present to us again next month.

And as you know, the number one recommendation of that report for improving K-12 science and math education was to improve the teacher training, and that report follows 20 years of agreement by education experts on the issue, and I think every expert that has come before this committee has said it is teacher training, and not only does the President's American Competitiveness Initiative not focus on teacher training, it does not even include a specific science education component.

As I have mentioned earlier, approximately 70 percent of the education component of the President's Competitiveness Initiative focuses on K-8 math curriculum, math curriculum at the Department of Education. How does the Administration justify such a different focus, and on what expert advice was this decision made?

Dr. MARBURGER. Mr. Chairman, the education really rests on three important pillars. It rests on curriculum, on pedagogy, the art of teaching, and on evaluation, and all of those have to be advanced in a balanced way in order to ensure effectiveness in education.

At the beginning of his Administration, President Bush launched the initiative that we all know as No Child Left Behind, that included very important components of literacy, science, and math

education. And when the American Competitiveness Initiative emerged, and the *Gathering Storm* report that preceded it, this Administration had already embarked on major reforms in areas at all levels of education that feed into the quality of science instruction and eventual competitiveness of our nation.

It was necessary to craft the American Competitiveness Initiative to fit into the already substantial investments and plans that were laid under the No Child Left Behind initiative, and I believe that the framework of the ACI in its education initiatives does reflect a considered approach to the entire spectrum of needs of the education. You will note that in current budget requests that we are discussing in this hearing today, the President has asked for additional funding for the education and human resources component of the National Science Foundation, it is actually a very healthy increase, and maintains funding in the Math and Science Partnership, which most people agree is an important component of enriching math and science education at the lower grade levels that you are referring to.

So, by no means has this component been ignored by this Administration in laying the plans for future economic competitiveness. We are proud of the investments that we are making. We agree with *Gathering Storm* that there is a need here, and we feel that this budget addresses that need.

Chairman GORDON. Dr. Marburger, I see that you have attended the school of rope-a-dope in trying to move through your five minutes. You did a good job there, but it is interesting to me how you can say "a balanced approach," when 70 percent of the funds go to K-8 curriculum. This is really just a backdoor way to try to fund No Child Left Behind, which is fine. I think we need to fund No Child Left Behind, but that is different than the competitiveness issue.

You mentioned nothing about teacher training. Over 50 percent of the teachers in this country that teach math have neither a certificate or a major in that degree; 92 percent of the physical science teachers have neither a certificate or a major in that area. You know, all the experts tell us we have got to help these teachers better understand their topics.

You know, clearly this does not address that, and it is disappointing. And I guess it is really sort of rubbing our nose in it to talk about the National Science Foundation, when you have cut by over 50 percent their education component, one that has been working for 50 years. So, that is a concern.

Now, let us move to NASA. There is a lot to talk about in NASA, but I will try to be very succinct here. I would like to ask you why NASA has not been included in the American Competitiveness Initiative. NASA's basic research and technology activities meet all of the metrics you established in the ACI for inclusion in the National Science Foundation, DOE Science Program, and in this program. Can you explain the inconsistency in your treatment of NASA's research programs?

Dr. MARBURGER. Yes, sir. Be glad to do that.

NASA focuses on discovering new phenomena and understanding the phenomena in outer space. It does this through various observational platforms, and we believe that NASA is funded more com-

mensurately with the challenges in that particular area of science than the other agencies that were identified for ACI priorities.

Chairman GORDON. So, you don't think that research in aeronautics and the other scientific research of NASA is world class, and isn't also part of their charge?

Dr. MARBURGER. No, absolutely. It is part of their charge, and they do a good job at it. But frankly, it is funded better than the physical science in these other agencies that has been underfunded for a long time, and we need to catch up.

Chairman GORDON. Well, it took a \$300 million cut, another cut in aeronautics research. How are we going to get this done? How are we going to be competitive with the Europeans, when the Europeans say that our planes can't land if they are not quieter, or if they are not more fuel efficient, or if they are not less polluting, how are we going to meet that challenge?

Dr. MARBURGER. I think it is important to conduct research in civil aeronautics, and I believe that NASA is attempting to address the effectiveness of the research in that area with management actions that improve the performance of civil aeronautics research.

Chairman GORDON. Well, let me ask you just one last question, Dr. Marburger, and we need to get on.

We had a very interesting hearing from the National Academies on the Decadal Survey. Have you had a chance to review that?

Dr. MARBURGER. Yes, sir. We commissioned that survey. We require NASA and the National Science Foundation and, I guess, NOAA to ask the National Academies to conduct the survey.

Chairman GORDON. So, do you agree with their conclusion?

Dr. MARBURGER. I agree with many of their conclusions.

Chairman GORDON. Which ones don't you agree with?

Dr. MARBURGER. The one that I don't agree with was the recommendation that we put instrumentation that would address observational needs back on the NPOESS satellite, which is not possible. It will be necessary for us to craft another solution to the very serious problems that we recognize and that they identified. So——

Chairman GORDON. And if that is your only problem that you have with it, let me ask you this. Why doesn't your five-year budget plan for NASA's Earth science plan reflect the funding needed to make the outyear investment recommended by the National Academies' Decadal Survey?

Dr. MARBURGER. We believe that the outyear recommendations for observational instrumentation do reflect a priority here. These are issues that require long-term planning, and——

Chairman GORDON. I am sorry, you said reflect the priorities. But—are you saying—reflect the priorities of the Decadal Survey, or reflect some other kind of priority?

Dr. MARBURGER. We believe that the observational platforms that gather information required for climate change science and other areas of science——

Chairman GORDON. Weather, NOAA.

Dr. MARBURGER.—are very important, and we are very concerned about those platforms, and we are prepared to support appropriate levels of funding to sustain them in the future. My office——

Chairman GORDON. But is appropriate level less than what the Decadal Survey recommended?

Dr. MARBURGER. It is possible.

Chairman GORDON. Well, it is not just possible. I mean, it is a fact that it wasn't put in here, so how do you determine what is appropriate? Again, this was a two and a half year study that was very comprehensive and they made one recommendation, but you don't think it was appropriate?

Dr. MARBURGER. But sir—the plans to place observational instruments on NPOESS——

Chairman GORDON. Well, that was just one part of it. There are 17 different missions——

Dr. MARBURGER. Yes.

Chairman GORDON.—that they were proposing. And you know, as we all know, it is (as Mr. Rohrabacher pointed out yesterday) disgusting to all of us that \$3 billion was wasted on NPOESS which would have covered this whole program. Now, that is spilt milk, but——

Dr. MARBURGER. We agree, and we don't want to throw more money after—on new programs without understanding them thoroughly. We are working with all of the relevant agencies to identify programs——

Chairman GORDON. I don't think it was new programs. I think it was bad management that led to the problem.

Dr. MARBURGER. Highly possible.

Chairman GORDON. Yeah. Well, you know, I—excuse me. I don't want to be argumentative, and I have taken more than the time that I should have. Let me yield to Mr. Hall.

Mr. HALL. Mr. Chairman, I would yield you back some of my time, if it would help me with you, or help you with Mr. Marburger. If you would like to have half of it.

Chairman GORDON. Well, I think that Dr. Marburger and I agree on 99 percent of the occasions. He doesn't write the check, and so it is difficult for him to do all that he would like.

Mr. HALL. Dr. Marburger, you hold a very unique position, overseeing the—I guess what most people consider the largest driver of economic success and progress in our country, science and technology, and Mike Griffin, I have had visits with Mike during this session and toward the close of last session. I am sure our chairman has, because Mike is doing a great job, but the Administration has to acknowledge that the budgets that are being provided to him are fostering additional delays. There is no question about that.

But we are in a dilemma as to how to handle that situation, as to whether to get more realistic now and lessen our expectation, or as I have heard the President say a lot of times, I know you have to, that we are going to grow our way out of this, and that is very possible, because at the beginning of this year, lost probably the greatest economic boon and drive that this nation has had in a long, long time, and we have the ability to overcome, and I think the problem of what I have suggested to him is to hold our expectations, and continue to expect our expectations, and not give in on them at this time.

As I mentioned in my opening statement, the funding levels for the exploration mission at NASA, reductions in this area are going to really push back the development of our next manned space vehicle, and leave us with a lot longer time gap before we can have access to outer space. And I would ask that you address the effects this gap may have, in terms of our skilled workforce, as well our ability to use the Space Station and our obligations to our international partners. Most of the \$545 million shortfall is going to be borne by the exploration systems program.

And what steps has the Administration taken in response to this proposal, and the letters we have written to them suggesting they put the half a billion back. Can you just generally, in the short time I have left, clear that up for me?

And do you agree with the fact that we shouldn't yield on our expectations and our projections, and our requests continue and have some hopes that with a half a percent lessening of unemployment raises about \$122 billion a year, and we expect that to happen, and it is happening. And I think there is a possibility that we can hold the schedule, and what are your suggestions on that?

Dr. MARBURGER. Sir, my main source of information about this, and about future prospects, come from Director Administrator Griffin, who I agree is doing an excellent job there in a very difficult situation.

It is true that there will be workforce impacts. I believe that they will be inevitable in any case, as we transition from a Shuttle-based NASA budget to the next generation of equipment and operations, but I think that that can be accommodated. It certainly is going to be difficult for NASA to achieve what it needs to achieve, with the constraints that are emerging in its budget situation, and I must say that I don't have the answers to all the questions that can be asked there.

I don't believe that we should retreat from our expectations of these programs. I think that we should try to find a way to make it work, and I am sure that working together with Congress and with the Administrator, we can find ways to do that.

Certainly, this Administration is committed to living up to its commitments to its international partners. We are going to complete the Space Station. We are going to get some use out of it, but we also need to proceed with a design and development and construction and launch of this next generation Crew Exploration Vehicle. Administrator Griffin feels very passionate about this, and I am sure you have heard from him and will hear more in the future. And I would tend to support his analysis of the situation.

Mr. HALL. It was a bold statement initially made in fairly good times, and it is more bold now to hold onto it, but I hope you will encourage those with whom you work and you oversee to hold onto that, and not yield to it, and lessen our expectations, because I think it is very necessary, one, to keep the international partners we have, and keep our word with them. A lot of things go on completing this new bird and getting into a new era.

Thank you. I yield back my time, Mr. Chairman. Thank you.

Chairman GORDON. Thank you, Mr. Hall.

Dr. Marburger, I think that you will find universal respect for Dr. Griffin and his ability, but a \$5 billion shortfall is just a little

too much even for someone of his ability. There needs to be more money in this program.

Our first person here today was Dr. McNerney. We yield to you for five minutes.

Mr. MCNERNEY. Thank you, Mr. Chairman and Dr. Marburger for coming down and meeting with us.

I was reviewing some of the details of the budget here, and I see that there is a significant increase in the fusion energy sciences allotment. Is there a particular reason that you think that there would be a breakthrough in the fusion, or a request from other countries? What is the reasoning behind that increase?

Dr. MARBURGER. Sir, if I am not mistaken, that is associated with our commitment to the International Fusion Program, whose acronym is ITER, to which we have made an investment. This is universally regarded by the fusion science community as an essential next step for the very long path toward practical exploitation of nuclear fusion for power generation, and this is regarded an expensive, but necessary investment for our nation to make so we can participate in whatever technology comes from that program.

Mr. MCNERNEY. Well, where do you expect most of the construction to be taking place, or most of the research to be taking place on that?

Dr. MARBURGER. The project itself, the device itself will be located in France, after an extended negotiation regarding the siting for this, it ended up in France, but research is taking place around the world, and the U.S. is a leader in this field, and the center of U.S. research in this field is the Princeton Plasma Physics Laboratory, operated under the ownership of the Department of Energy Office of Science.

Mr. MCNERNEY. Is most of that research the tokamak type technology, or are we looking at inertial confinement fusion?

Dr. MARBURGER. There is an inertial confinement component to the research that is sponsored by the Department of Energy, but the main center at Princeton is tokamak type research, and related devices.

Mr. MCNERNEY. Okay. Moving along, several items here. The National Renewable Energy Laboratory has a significant cut compared to the '07 budget. What is the reasoning behind that cut?

Dr. MARBURGER. I believe that the budget numbers don't accurately reflect the revenues that are expected by the laboratory. As it turns out, the way these laboratories are funded depends on ongoing awards during the course of the year, and that laboratory does not expect to experience the kinds of cuts that you might have inferred from the budget numbers. So, they expect to receive awards during the course of the year that will add to the numbers that are shown in the book.

Mr. MCNERNEY. Okay. I am going to reserve judgment on that, on that particular issue.

Dr. MARBURGER. Yeah, I would be glad to answer in writing, to give you a more detailed view of that as I understand it from the Department of Energy, the numbers don't accurately reflect the actual resources.

Mr. MCNERNEY. Well, one of the things that didn't make sense was it looked like there was a significant increase in the solar en-

ergy budget, and yet, the NREL budget is going down, so I didn't see how that can——

Dr. MARBURGER. Yes, it is even possible that some of those funds that are in the solar budget would be transferred later out to the laboratories, such as NREL. NREL is a laboratory that profits from the reallocation of those funds. They don't have a budget that is appropriated in quite the same way as other branches of the government.

Mr. MCNERNEY. Okay. Again, I reserve judgment on that one. Why the significant cut in geothermal power this year as well?

Dr. MARBURGER. I am not sure about that. I think that one of the reasons is that geothermal power is regarded as an important ancillary power source, but not one of the power sources that is likely to have a very large share of alternative energy in the future. So, there is some scaling back there, and some increase in some other areas that are scaled up. We try to respond to proposals from the Department of Energy, who are the experts in this area.

Mr. MCNERNEY. Okay. On to homeland security and the science and technology. There seems to be a large bias toward the biological and chemical threat, and I guess I understand there is a report forthcoming on the assessment of the threat versus the risk. Is that report in the works? Are we going to see that soon?

Dr. MARBURGER. I don't know about the status of that report. I do know that there is a continuing study of the balance of expenditures on different types of threats to homeland security. There is a relatively recent new director of the science area there in DHS, who is restructuring the units, and undoubtedly will have something to say about this.

The—so, I would be glad to answer—there are some statements in my testimony about it, but I would be glad to—I think that the details of that would require a written response to a question, I would be glad to provide.

Chairman GORDON. The gentleman's time has expired, but let me make everybody aware that certainly, any written questions can be submitted to the witness.

Dr. MARBURGER. Okay. Thank you.

Chairman GORDON. And the gentleman from Georgia is recognized for five minutes.

Mr. GINGREY. Mr. Chairman, thank you. Dr. Marburger, thank you for being with us this morning, and I am almost a new member to the Science Committee, having a two year gap, but I remember back in the 108th Congress, we were beginning to have hearings, and more and more information about something that sounded new, and that being nanotechnology, and I am particularly interested in that, particularly the health aspects of it, as a physician, still am a physician, but not practicing.

And also, as a graduate of Georgia Tech, the Georgia Institute of Technology in Atlanta, and you know, there is a lot of research and development going on there at Georgia Tech, and I noticed that over maybe the last seven years, that the amount of funding for nanotechnology has, in fact, tripled. I believe the current amount in the President's budget proposed is almost \$1.5 billion. I am pleased with that, but I would like for you to particularly to address this issue about the health potential of nanotechnology,

and I noticed of that increased funding in that budget, a large portion of it, after you get out of the National Science Foundation, the Department of Health and Human Services is, I think, what \$5.7 million, \$28, almost \$29 million under the National Science Foundation.

But tell us, there is not really a question, but discuss with us a little bit about what are the health concerns, as we continue to develop this technology, and I am absolutely convinced that it is something that we need to do, but if you could talk a little bit about health concerns in regarding that.

Dr. MARBURGER. Yes, sir. The health concerns are similar to health concerns about new chemicals or new chemical products that may escape into the environment and affect drinking water or the atmosphere or domestic or interior spaces, and the means that we have to address those concerns are similar to what we do now for the chemical or bio industries. And through the EPA and—particularly in establishing standards for industry.

All of these relevant agencies participate in the National Nanotechnology Initiative, and their activities regarding health impacts are monitored. We have conferences and forums and monitor the literature, and try to make sure that there is investment by those agencies in the necessary research. So, NIST and EPA, National Science Foundation, and National Institutes of Health are all making investments that are relevant to understanding the health impacts.

Nanotechnology does produce materials that are unprecedented, are new, and whose health effects have to be studied. So, it is important to make investments in this area. We have been watching the investments that the agencies make and they are arising. Probably they are arising about as fast as the capacity of the research community to do the work. Many people have called for even more investments, and I believe that more investments will be forthcoming and the interest and the capabilities in the research community grow. We are certainly not, by no means are we opposed to that. We think it is important.

I might add that the President's Council of Advisors on Science and Technology, of which the President of Georgia Tech is a member, have a particular responsibility to provide oversight for the Nanotechnology Initiative, and they have expressed interest in the health impacts, and are watching that. I expect that their next report to Congress on this initiative will include special attention to the health effects.

Mr. GINGREY. Well, Dr. Marburger, I appreciate you giving a plug to the President of Georgia Tech, and I want to make sure, Mr. Chairman, that we know what his name is, Dr. Wayne Clough, one of my classmates.

So, thank you, Dr. Marburger, and I will yield back the balance of my time, Mr. Chairman.

Chairman GORDON. Well, if you don't mind, Dr. Gingrey, I will take a little bit of your time.

You have raised a very, very important point, and we are going to have more hearings on this later in the year. What is happening right now is there are a lot of products, or nanotechnology products that are out there already. I am very concerned that this field

could meet something of the fate that the genetic grains did, in the sense that the technology got out before the public confidence, and that I think that we have got to make sure that one, obviously, that the products are safe, but also, if they are not safe, we need to get them off the shelf, but if they are safe, we need to have the technology, the information, behind us so that the public also feels this.

I think that we are not up to speed on that in this country, and this is something that we are going to work on. There are some international groups that are working on that. This is important technology, but it can all be lost if there is not good faith in it. So, thank you for raising that, and you will see more of that issue.

Mr. Mitchell from Arizona is recognized for five minutes. Mr. Lipinski, the Vice Chair of the Committee, is recognized for five minutes.

Mr. LIPINSKI. Thank you, Mr. Chairman.

I thank you, Dr. Marburger, for your testimony today. I wanted to echo a few things that the Chairman has mentioned. As a former engineer, and as a Professor, I am concerned about the lack of funding for STEM ed in K-12. I just want to echo what the Chairman said on that. I think it is critical for the future and for our future competitiveness, I know that we are having problems with attracting and training more engineers, and I think K-12 education is a big part of that.

I would also want to talk a little bit about the Manufacturing Extension Partnership. Manufacturing is very important in our country. Sometimes, I think we believe that it is an industry that can be replaced by other industries, but I think we have to understand that it is critical. If we cannot manufacture items, we are not going to be able to survive, because it is important to have that here in our country. I have certainly seen a lot of manufacturing leave from my district, oftentimes going overseas to China. I think we need to do more on that, to help our manufacturers in this country.

And also, on nanotechnology, I think, as the Chairman said, we need to make sure that we don't have a situation where nanotech is being used in a lot of things already, and people don't know about it, and when people hear about nanotechnology, they have all kinds of concerns about it, just because they simply don't know, and we haven't done enough to let them know, and convince them that this is going to be safe, and all of the research hasn't been done to make sure it is going to be safe, but I think it is critical for the future. At Northwestern University, they have a Nanotechnology Center, which I have been to, and I really think that it is one of the keys to our future economic development in this country, being there, it is sometimes called the new Industrial Revolution. I think nanotechnology may be that.

But the one thing I wanted to get into and ask you a little bit more about. The President is proposing now a third Bioenergy Research Center, through the Office of Science at DOE. The state of Illinois is in a great position for this, I believe, because we have, obviously, a lot of rich cropland, and you know, first rate universities, national labs, and a lot of companies that are interested in doing this. The University of Illinois at Urbana-Champaign, in collaboration with Argonne National Lab, Northwestern University,

the University of Chicago, University of Illinois at Chicago, and Archer Daniels Midland, and others have submitted a proposal for the Bioenergy Research Institute.

I just wanted to know, I want to ask you a little bit about what you are looking at, what is going to be looked at in terms of where to place these centers. My understanding is there is probably going to be one on the East Coast, one on the West Coast. Certainly, I think Illinois would be a great place to put one in the Midwest. And I just want to know what the timeframe is, and what exactly you are going to be looking at for the center?

Dr. MARBURGER. These centers are an initiative out of the Department of Energy, and we rely on them to make those judgments. It is their proposal. They are going to run the process, and make the decisions. Our responsibility is to make sure that they are paying attention, and have a valid sort of an objective review process, and I would direct you to the Department of Energy for specific responses to the questions that you are asking.

I would agree that Illinois is an excellent center of research in this area, and as a matter of fact, I note that recently, British Petroleum is funding a center in California, of which the University of Illinois is a component.

Mr. LIPINSKI. Yes.

Dr. MARBURGER. So, they are already in this game, and they are a major producer of federally funded research in your state. But regarding the specific criteria, and what they are looking for, and how they will run this competition, I do not have those details, and that will be done out of the Department of Energy. Dr. Orbach undoubtedly will be able to address those—I will be glad to respond, to help get that information for you.

Chairman GORDON. The gentleman's time has expired, but I had a conversation with Dr. Orbach about this yesterday. His response was that by virtue of his charge, that he could not really say where it is going, because he didn't know quite yet, that I think all of the applications had to be turned in in December, and that they were reviewing those, and I think in the next two or three weeks, they are going to make recommendations for the three locations.

Mr. LIPINSKI. Thank you, Mr. Chairman. I wanted to thank Dr. Marburger also for mentioning the collaboration between University of Illinois, University of California, and BP on that center. It is something else that I wanted to mention there. Thank you.

Chairman GORDON. Mr. Akin is recognized for five minutes.

Mr. AKIN. Thank you, Mr. Chairman.

Dr. Marburger, one of the things that I run into, I am on the Armed Services Committee, as well. We work with a lot of small defense contractors in the St. Louis area, and there has been a fairly consistent pattern as I have had a chance to visit them, and ask them about what their concerns and priorities are, with the lack of being able to find engineers. They said about the only engineers there are, is you have got to go to China or India or something to get one, and that we are not producing enough.

Now, this is something that they used to do in Harvard Business School for case studies, they say don't tell me the second or the third most important thing you do. If you had to pick one thing that the Federal Government might do that would influence this,

what would be the single biggest thing that you would suggest? (And you don't have to buy the premise, either.) If you think the Federal Government shouldn't be involved, I am inclined to think that way, too, on many things. So whatever you think.

Dr. MARBURGER. Well, let me just mention one big thing that we strongly support, and that is the Department of Defense's National Defense Education Program, which is scheduled for a big increase in this budget. You may recall that in my generation, when I was going to college, the *National Defense Education Act* made it possible for a lot of young people like myself to go into science and engineering fields, and we expect that that same phenomenon will happen. This is something that strongly affects the Department of Defense. They have a need for U.S. citizens to be engineers, and they are willing to fund these programs, and as the request——

Mr. AKIN. What exactly—the programs just encourage kids to get into science, or are they more scholarships programs?

Dr. MARBURGER. They are more like scholarship programs, as I understand it. But there is also a very strong correlation between sponsored work in engineering and physical science areas and the degrees granted, so I regard the ACI itself as providing a major stimulus for the production of engineers that does respond to this widely recognized need for increased engineering production.

Mr. AKIN. Just along the same lines, one of the things that my kids were involved with a year or two back was a robotics competitions. I mean, I am an engineer, but it might not be the best way to get engineers. My engineering came from a horrible experience with Latin in eighth grade, and I decided that engineering was the one place you didn't have to learn a foreign language, so that is why I went there, and I didn't know anything about calculus at the time, that it was worse than a foreign language.

But anyway, I guess, if I had to pick something, one of the things that kids really like is gee whiz sort of displays and exhibits and things, and I am just wondering do we have anything like the robotics, where kids get that hands-on. They don't sit in a boring classroom, but they get to learn by doing stuff. Do we have a way to sort of open the doors of all of the different really incredible scientific things that are going on for kids?

Dr. MARBURGER. Most agencies that fund science or science centers, or have federal laboratories also have ancillary education programs, little museums or teacher training centers, or hands-on experiences. And all of these sort of educational experiences are currently being reviewed under the auspices of the Department of Education and the relevant agencies. There is a committee, I can't remember, its ACC committee, that is currently evaluating those programs, and trying to make sure that they are as effective as they can be. And we hope that this process of assessment will also lead to the sharing of best practices.

But there is a very large number of hands-on programs that are funded by agencies like the Department of Energy or NASA, you are probably familiar with some of the——

Mr. AKIN. Well, one other quick question. One of the things that happened in secondary education was that we changed the way we did testing, and we did it so we could fudge. We love to fudge numbers. Americans love to fudge on the rules, and what we do is we

change the basis of the tests every year, so we don't really have any benchmark as to how well we are doing or not well we are doing.

My sense is that secondary education is falling very, very short in maths and sciences. At least even seven years ago, when I was a State rep, the heads of the universities all came and cried about the quality of the students they were getting out of secondary education in the State of Missouri. I assume that may be a national pattern. Any thought on that subject?

Dr. MARBURGER. Yes. The ACI does have specific components addressing the improvement of teaching of science, particularly at the secondary level, and there is an Adjunct Teachers Corps proposed, and programs to prepare teachers to teach advanced placement subjects, as an example.

Mr. AKIN. Thank you. Thank you, Mr. Chairman.

Chairman GORDON. Yes, sir. Again, Mr. Akin, I don't want to take too much time. You raised some very good points. This committee is going to address that with—and I don't guess you were here last year, when Norm Augustine reported on his *Rising Above the Gathering Storm*. They have laid out a blueprint for us, and I think we are really going to take an initiative there.

Unfortunately, a lot of those gee whiz programs within the Administration are being cut back at this time, which is unfortunate, but there is some good news. The Department of Energy, within their Science Office, is starting a program where they are going to bring in science teachers to the various labs. They will come in for the summer, have a program there, and then, the next year, they will bring their students into the lab. I think it is really going to help to inspire those, because most every scientist who has come before this committee has said the reason they got into science was the inspiration of a teacher. Some of the time it was a gee whiz, but mostly, it was a teacher. If we don't do anything else this year, we need to get that done, and I hope that we will all work together to accomplish it.

Dr. Baird is recognized for five minutes.

Mr. BAIRD. Dr. Marburger, thank you for being here today, and taking so much of your time. I am going to give you two questions, and you can parse out your answer accordingly.

First of all, I am interested in whether it is your belief that NSF should maintain its predominant role, in terms of the science education side, or should that be shifted over to the Department of Education? And I will share my bias. It is just an evidence-based belief, a judgment, that NSF actually has a strong tradition, and is certainly the preferred source. I have spoken to many, many educational institutions, and they would not like to see the NSF education mission shifted over to the Department of Education. So, I will put that out, and would welcome your response.

The second part is, is it your belief that the NSF should continue its responsibility for the icebreaking mission up north, given that basically, it is essentially a pass-through to the Coast Guard? Should not the responsibility shifted directly over to the Coast Guard, to let NSF focus its resources and management on more core missions, and possibly have more flexibility regarding its data collection in the Arctic region, other than just icebreaking?

Dr. MARBURGER. Congressman, I do believe that the National Science Foundation has a very important role education. That is part of its charter, and indeed, I think it must continue to deliver outstanding research and models and ideas that can be promulgated throughout our educational establishment at all levels.

Education is a very big issue here. It is a very large phenomenon in society, and there is a lot to do, and there are different types of things that need to be done. We do have a Department of Education that has a major role to play in the development of best practices in the classrooms throughout the country. And I believe that the Department of Education and the National Science Foundation have to work together to deliver the parts of the needs to address, the needs that are relevant to their specific missions.

And I think it is necessary to try to figure out who should be doing what, and if the Department of Education doesn't have the necessary strength or quality controls, then we need to make it better, and I know that the Secretary of Education is determined to improve the performance of the Department of Education in these areas. Educational research that is appropriate to the Department of Education has improved in this Administration, and indeed, certain types of fundings to improve it have been supported repeatedly in our budgets.

But it is also true that the National Science Foundation does have a good track record, in educational research and in programs for training teachers, and we think that they should continue to do that in their appropriate domain, but I do not think that it should all be done out of the National Science Foundation, and I don't think it should all be done out of the Department of Education. But we need to work together on this to make sure who should be doing what.

So, let me answer the icebreaker question briefly. It will be necessary for this nation to maintain its capacity for icebreaking and for access to the poles for many reasons. And it is essential for the National Science Foundation to have access to icebreaking capabilities. Now, from my perspective, I don't care how they get it particularly. I think that the main concern is to spend the money wisely, and if that means giving it to the National Science Foundation, and having them procure the service, then so be it. If it means giving the money to the Coast Guard, and having them do it, and then provide the service, then so be it. But I think, from the highest level perspective, it is "money is money." If we can save money and have more of it for science, then I would go with that.

So, we sponsor interagency discussion on this, and we have been working the issue, and trying to foster a path for it. I know it is currently under intense scrutiny, but the report from that group that is working it hasn't been delivered yet. It is under review. And I will support whatever the interagency agreement is on it. I can't say how it will come out.

Mr. BAIRD. Thank you, Doctor. I share the premise. I don't necessarily have a dog in the fight. I just think if we can spend the money more efficiently, and let NSF focus on its core mission, while still having access to the poles, that makes a lot of sense.

I yield back.

Chairman GORDON. Thank you, Dr. Baird. You know, I have to say I agree with Mr. Marburger that there should be some balance, but the fact of the matter is that the National Science Foundation's 50-year successful program, has been cut by 50 percent, just in the last few years. That is not balance.

Mr. BAIRD. Mr. Chairman, if I may.

Chairman GORDON. Certainly.

Mr. BAIRD. Mr. Marburger, I appreciate the notion that Department of Education has to work with NSF on this, but I just want to underscore that in the last few weeks I have met with probably 30 or 40 provosts and research directors from some of the leading institutions in this country, colleges and universities. They are almost unanimous that NSF should be the focus of teacher training in the area of sciences, and that is where the mission should come from. And they also, actually, advocate increasing collaboration and cooperation between the discipline-focused sciences and the education side, but they think the origin and aegis of that should be NSF, not Department of Education.

Thank you.

Chairman GORDON. We hear it over and over, before this committee and at home, over and over.

My friend from California is recognized for five minutes.

Mr. ROHRABACHER. Were you referring to me?

Chairman GORDON. It depends on what your question is.

Mr. ROHRABACHER. Let me, before I ask my question, just note, Dr. Marburger, since we are talking about education, and this was driven home to me yesterday. I am trying to expand nursing programs at our junior colleges in my district, and in our area. And well, and the reason why it is so difficult for our junior colleges to do that is that the unions of the professors of these various colleges are saying no, you cannot pay someone who is teaching nursing and medical type of courses more money than you pay someone who is teaching English literature or history; and thus when we have this dramatic shortage of nurses, we are unable to establish programs that will result in more nurses for our society. And there are wonderful jobs that are available for people with nursing degrees and teaching, and very few jobs that are available for people with English literature degrees. Just yesterday, I was trying to meet with the educators from my area on that issue, and the same is true with science education and mathematics in high school and junior high school.

If we could just break through this hold that unions have on "everybody else should be paid exactly the same, whether you teach basket-weaving or physics," we would have better teachers going into these fields, and it wouldn't cost a lot of money. That is just one thing that I am just throwing out, so when you are discussing this with other people, maybe we should focus on that, to try to change the structure that we have, so that we can recruit teachers and pay them more money, in order to get higher quality people, without having to pay basket-weaving teachers or physical education teachers more. I am an athlete and I appreciate that, but a fifth grade physical education teacher should not be getting—we should not be neglecting a mathematics or science teacher at that level, who will get a better job elsewhere, because we can't pay

them more money, in order to pay the phys ed teacher, or the guy who watches the kids when they are on recess.

So, anyway, that is a thought. I was noticing in the budget summary here that biomass is only receiving a \$15.8 million expenditure, and yet, the President has mentioned switchgrass and biomass a number of times, and people who I talk to suggest that biomass has a tremendous potential, and in fact, I notice then you have got \$160 million for fusion energy research, and let me just note there—the studying that I have done on fusion shows that there has been, over the years, billions of dollars spent, and I am going to see some people in my office just this week on this issue, and I have yet to identify really significant progress that has been able to be implemented to show any difference in our way of life, as compared to the potential of biomass.

So, are we not loading down the establishment, which you have so many people who pay their salaries of their scientists at their universities, but not really having so much to show after ten years, versus biomass that has a tremendous potential that could be put to use very quickly, even with the President's own words?

Dr. MARBURGER. Certainly, biomass is a very important option for energy for the future, and this Administration does support biomass research and development.

Mr. ROHRABACHER. But only \$15 million worth.

Dr. MARBURGER. Well, my notes indicate that in the Department of Energy, there is \$292 million for biomass R&D.

Mr. ROHRABACHER. Okay.

Dr. MARBURGER. And we can discuss exactly where the numbers come from, but we have got here \$179 million for the Biofuels Initiative. There is an additional \$113 million in supporting basic research to (and this is directly related to the cellulosic issue, which we really need to have breakthroughs in).

Mr. ROHRABACHER. I see.

Dr. MARBURGER.—if we are going to make this. So——

Mr. ROHRABACHER. Okay.

Dr. MARBURGER. So, we have a disagreement——

Mr. ROHRABACHER. Well, thank you.

Dr. MARBURGER.—about the numbers that——

Mr. ROHRABACHER. Okay. I am just——

Dr. MARBURGER.—we can straighten out.

Mr. ROHRABACHER.—reading the figures, then, and I appreciate you——

Dr. MARBURGER. It is easy to do, Congressman.

Mr. ROHRABACHER. Yeah. I appreciate you clarifying this. And one fundamental question, if I may. You know, we had this hearing here yesterday with the decadal report, which was very impressive, and I was impressed by the fact that they offered practical suggestions, rather than just, you know, shovel more dollars in our direction, which is far too often what people are suggesting. Shovel more dollars, and we are going to have more progress. They actually made some very tangible recommendations, and they made some observations about the minimum necessary to do this and that, to accomplish very admirable goals, and not just some, “well, we are going to prove global warming,” but instead, “we are going to determine how we are going to affect people's lives,” et cetera. But here

we have \$500 million, which they claim they need to spend more, and I mentioned that we had this, of course, \$3 billion overrun with NPOESS, which was very disheartening.

But along with NPOESS, we have to recognize there is a war going on in Iraq, and today I am supporting the President's surge request, and I have had to do a lot of praying about this, and a lot of thought about this, because we are talking about, Mr. Chairman, we are talking about billions and billions of dollars every month, and here, for the Decadal Report, that was just asking for \$500 million a year.

Is this Iraq situation really having a major impact on science in our country?

Dr. MARBURGER. I am not sure that is a scientific question. Congressman, I try to work within the realm of the possibility and the practical. What I can say is that the United States is spending an enormous amount of money on research. We far outspend any other country, and all of Europe on our research budget, and so there is a lot of money on the table, and it is not just a question of dollars.

Actually, Chairman Gordon has made this point, there is a question of priorities, and we have to negotiate and discuss what the priorities are, and try to come up with something that we can agree to fund. And I think we will do that. But it is not just a question of money. We have got to spend this money wisely. As science becomes more expensive, and there is more and more demand for whatever funding we put on the table, I think we owe it to the American people to do the best job we can at identifying what is the most important thing, what is the most important way to spend the money, and that is what I am dealing with.

So, I would say that science is doing very well in this country, but we need to keep our eye on the ball, and make these adjustments as we go along to make sure we are spending it in the right place.

Mr. ROHRBACHER. Well, thank you very much. I won't push you any further on that question.

Chairman GORDON. The gentleman's time has expired. I will say that, I guess the good news and bad news is that yes, the country is spending a lot of money on science. However, as a percent of our GDP, it is continuing to go down, and it is lower than many other countries.

But to the Administration's defense, bioresearch, mass research, has been a priority. And I think that hopefully, we are going to see some breakthroughs there, particularly in the areas of new enzymes. Five minutes to Dr. Ehlers.

Mr. EHLERS. Thank you, Mr. Gordon, and welcome back, Dr. Marburger. I am pleased to see you here, and I hope you will soon be fully recovered.

As you know, I have been very active on STEM education, science, technology, engineering, and math education. We formed the STEM caucus. We have over 100 members of Congress as members, and the Senate has decided it is such a good idea, they started their own. So, it is no surprise that I will be asking about some issues relating to STEM education.

First of all, just for starters, how, if at all, is the work of the Academic Competitiveness Council reflected in the Fiscal Year '08

budget request for STEM education? And as you know, they were appointed to advise the Administration on many of these issues. And I am not sure they have fully reported yet, but has their report——

Dr. MARBURGER. Yeah, very briefly. The work of that committee was going on more or less in parallel with the preparation of the budget, so it did not have an opportunity to have a major impact on it, but I don't doubt that it will in the future.

Mr. EHLERS. I appreciate that, and I hope that it will have a major impact on the budget. Another issue is regarding the National Science Foundation educational programs, and you know, I don't hold you responsible for this, because I know who was responsible for the past decisions, in which money was basically taken away from the National Science Foundation education effort and moved over to the Department of Education. And I have absolutely no problem with the Department of Education, after many years without much interest in this, finally showing an interest, and I appreciate Secretary Spellings' very hard work on it, and her very strong feelings about doing it.

That is not the point. The problem is, as I told her, why take the money away from NSF? They are the ones who have been doing it for 50 years, and have done an outstanding job. They were the ones who will be doing it 50 years from now, whereas the Department of Education changes much more rapidly, and with a new President coming in, we may not have a math science effort in the Department of Education.

I appreciate what you have been able to do with the NSF's budget, but I wanted to emphasize, and I hope you will agree with this, that this a major issue. The NSF has done great work on it. The interesting thing is they also do the groundbreaking work, and the best evaluative work of anyone in the business, in this country or other countries. And I hope you can join with us in making the entire Administration aware of this, and help us in our efforts to increase funding, for that part of NSF, as well as the other increases they have received.

I would appreciate your comments on that.

Dr. MARBURGER. Well, I think this year's budget request by the President for the National Science Foundation should be good news for those who value the education component of NSF. It does respond to favorable reviews of the quality of the work that NSF does, particularly in the areas that you mentioned, Congressman.

So, in that respect, some of the work that was done in connection with the ACC exercise did affect thinking about the value of that work and the quality of it in NSF, and so, this year's budget does reflect increases for the education and human resources section of the National Science Foundation. I expect that will continue.

Mr. EHLERS. I hope it is not a one year blip, but in fact, an indication of a changed policy, and that the ACC report coming up, I think it is in April you get the report. I would hope that next year's would show an even greater increase.

So, one last question. Yesterday, we had a hearing in this very committee on the Earth Science Decadal Survey, and all of the Committee Members who were present here recommended that OSTP should develop and implement a plan for sustaining global

Earth observation, and a single point of contact or program office at the cabinet level should be established to assure complementary efforts for all operational aspects of Earth observation and analysis. And those are precisely their words, and they all stood by those words.

Do you see something of this sort happening? The general feeling is that Earth science, as looked at from outer space, has decreased. The past few years, there has been less emphasis. Will we be able to turn that around, and get back to where we were?

Dr. MARBURGER. Earth observation is one of those areas that affects a lot of agencies, and it is certainly ripe for an interagency coordination activity. There are precedents for national coordinating offices. We have them for the National Nanotechnology Initiative, and for the Networking and Information Technology R&D Initiative, both of which are congressionally mandated operations, so there is a precedent for that. I believe that those two national initiatives are working well under that structure that Congress has promulgated. So, it certainly would not be out of the question to have something like that occur.

Mr. EHLERS. Well, everyone on this committee (I believe, I think I can speak for everyone) was impressed by the results that we heard yesterday, and would certainly welcome an administrative initiative on this.

Thank you very much. I yield back, Mr. Chairman.

Chairman GORDON. I thank you, Dr. Ehlers.

Dr. Marburger, I did not put Dr. Ehlers up to any of those questions. I think it demonstrates, once again, there is a bipartisan interest in the Augustine recommendations, and again, I don't mean to be argumentative, and if I am wrong, I stand corrected, but your office and the President had those recommendations long before this budget came up.

You know, those recommendations were ignored. They are not reflective of this budget. Again, I won't go over the statistics once again, but for Dr. Ehlers' interest, the education aspect of K-12 in National Science Foundation has been reduced by 50 percent over the last three or four years. We do have great bipartisan interest in this.

Again, I know you are a spear-carrier, but we are going to have to get together, and see if we can't work this out. This is important, on a bipartisan basis for this committee. You have heard it, again, without any kind of orchestration. I won't belabor that, but I thank you for your presence today, for dealing with the variety of issues that were before you, to still get here.

And I excuse the witness and adjourn this committee.

Dr. MARBURGER. Thank you.

[Whereupon, at 11:36 a.m., the Committee was adjourned.]



## Appendix:

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### ANSWERS TO POST-HEARING QUESTIONS

## ANSWERS TO POST-HEARING QUESTIONS

*Responses by John H. Marburger, III, Director, Office of Science and Technology Policy*

**Questions submitted by Chairman Bart Gordon****National Institute of Standards and Technology (NIST)**

*Q1. The FY08 NIST budget request looks like a case of robbing Peter to pay Paul. For example, the cut to MEP and elimination of the ATP just about offset the increase for lab funding and construction. It seems that rather than requesting any new funding for NIST, you are just rearranging the deck chairs. Could you tell us the specific criteria that are used for determining the NIST budget allocations and priorities?*

*A1. The President's budget request for NIST prioritizes the core research operations which are likely to have long-term payoffs significantly greater than the short-term impacts of ATP and MEP. Such long-term impacts are the primary objective of the American Competitiveness Initiative. It should be noted that the NIST budget has been earmarked in the past at levels much greater than the President's requested increase.*

*Q2. Since 2001, we have lost 2.9 million manufacturing jobs and last year alone we lost another 110,000 manufacturing jobs. These jobs are high-skill, high-wage jobs that on average pay 23 percent more than the national average. It is these types of high-wage jobs which are the backbone of communities across the country.*

*NIST just released an impact assessment of the MEP program. In the 2005 survey of only 30 percent of MEP clients, they reported:*

- \$6.3 billion in increased/retained sales;
- \$2.2 billion in modernization investment; and
- 53,000 jobs created or retained.

*These documented results represent only a small portion of the MEP's total impact. And, the results come from a federal investment of only \$104 million. What other federal programs to support manufacturers show a similar documented return on investment? Given the MEP's success rate and that small- and medium-sized manufacturers are struggling in the face of global competition, what is the justification for cutting the MEP budget by more than 50 percent?*

*A2. NIST meets the Nation's highest priorities by focusing on high-impact research and investing in the capacity and capability of NIST's user facilities and labs. This emphasis is validated by the high rate of return to the Nation that the NIST labs already have demonstrated. Nineteen retrospective studies of economic impact show that, on average, NIST labs generated a benefit-to-cost ratio of 44:1 to the U.S. economy. The high rate of return results from the fact that new measurements or standards benefit entire industries or sectors of the economy—as opposed to individual companies.*

*The President's request will ensure that funding goes to vital basic research to strengthen the Nation's innovation enterprise vital to manufacturing—especially in the areas of physical sciences, engineering, computing, and nanotechnology—instead of subsidizing research and consulting services that should be funded by private industry. Creating an innovation environment by supporting basic research has the highest payoff for all of society, including industry. Basic research results which can be used by a variety of researchers in academia and industry are much more important to economic development than are subsidies, through the Manufacturing Extension Partnership (MEP) program, that benefit particular firms and their shareholders.*

*MEP Centers provide manufacturing firms with consulting services that are also available through private entities. Given the benefits reported by MEP clients, it is reasonable to have these clients share a larger proportion of the cost of these services. The FY 2008 Budget request would maintain a network of MEP centers that are funded according to their performance and need, and would encourage these Centers to be more efficient by reducing their overhead costs, including high marketing costs. As first created in 1988, the MEP program anticipated that centers should become self-sufficient after six years of federal funding, which has not hap-*

pened. Centers could also ask MEP clients to cover more of the cost of the services through modestly increased fees.

*Q3. In FY 2003, the Administration requested \$13 million for the MEP, in FY 2004—\$13 million, in FY 2005—\$39 million, in FY 2006—\$47 million, in FY 2007, \$46 million and in FY 2008 \$46 million. Each year, the Administration provides a different and vague justification for cutting the program: it's not necessary, the private sector can perform all the tasks, other federal agencies will make up the funding shortfall, or that federal funding was not supposed to last beyond six years and this year that approximately 20 percent of MEP clients have more than 250 employees and therefore they can charge more for services and federal funding can be reduced.*

*Will you provide us the analysis that you have done to justify these claims and how the centers will absorb the proposed reduction. In addition, discussion of business size is a new issue. The Small Business Administration categorizes any business of less than 500 as small. Is the Administration seeking to redefine what qualifies as a small business?*

A3. The cost savings and efficiency improvements reported by manufacturing clients of MEP Centers result in reducing costs to MEP's clients and could be used to support increased fees for future MEP Center services. The annual reported benefits by manufacturing clients of the MEP Centers conducted through an independent survey demonstrates a significant level of cost savings and efficiency improvements for the MEP clients. For example, the latest MEP client survey results (released January 2007 and reflecting FY 2005 benefits) suggest that MEP helped 16,448 clients increase and retain sales of nearly \$6.3 billion; and generated cost savings of just over \$1.3 billion (both recurring and non-recurring). These benefits, resulting in reduced costs and increased profits for the client, could be used to support increased fees for future services. With increased revenues streams from client fees, MEP centers may offset the reduction in federal funds.

The data describing the fraction of MEP business serving clients with more than 250 employees was provided by the MEP in their analysis of their business ("Making a Difference for America's Manufacturers"), and was not a delineation chosen by the Administration.

*Q4. Approximately \$104 million is required to maintain a fully operational network of MEP Centers. What will be the impact of the Administration's proposed 56 percent cut on the current network of Centers and the level of services that they provide?*

*Could you please provide us with the impact assessment that has been done by the Department of Commerce? The FY 2008 budget request indicates that with the \$46 million for MEP, only a subset of Centers will be operational. What will this smaller system look like—will there be an emphasis on regional centers or will some states simply lose MEP coverage?*

A4. The MEP Director will work with the centers to develop options that consider each center's customer base, constraints, and opportunities. Actions taken by any center or group of centers will be assessed against their ability to maintain support to the small manufacturers. MEP will work with the centers to examine alternatives and optimize the best plan for operating at the \$46.3 million level that ensures the maximum benefit to small manufacturers.

*Q5. The Administration has justified the elimination of the Advanced Technology Program (ATP) because of a growth of venture capital funds and other financial services for high risk technology, yet this committee has heard repeatedly during the past five years that venture capital funds for high-risk technology development are scarce. Could you provide us with the documentation that supports the Administration's claims?*

A5. The Administration believes that other investments in cutting edge basic research, the tools of science and the next generation of scientists are the best way to lay the groundwork for continued leadership in innovation, exploration and ingenuity. Since the "dot-corn bubble" burst, venture financing has resumed growth. According to Dow Jones venture capital data, venture capital activity in 2006 is at a five-year high both in terms of the number of deals (2,454) and the total capital investment (\$25.75 billion). There is no evidence that the distribution of venture capital funding is not the best response to market demands.

*Q6. The Administration has justified abolishing the ATP because it only benefits single companies and not industry at large. The Administration claims that the*

*American Competitiveness Initiative will not impact individual companies but will be broad-based. The ATP's mandate is that it can fund projects that will only have broad industry impacts beyond a single company's private profit. I'll cite just a few examples of broad impact ATP projects: the two millimeter projects which helped the entire U.S. auto industry, the Affymetrix DNA diagnostics project, and the Integrated Circuit projects. In addition, the Administration funds many industry lead tech programs at the DOE. Why doesn't the ATP fit within the scope of the Administration's policies and current activities?*

A6. The ACI is about prioritization within limited resources. While the ATP program has had some successes, reviews by the GAO found that "it is not evident that ATP funding was actually needed for individual projects to achieve these results." For example, the two-millimeter project involved the Big 3 automobile companies. It is hard to see how several million federal dollars would enable Big 3 Auto to do something that they could otherwise not afford to do or that would not otherwise get done. Additionally, a survey of ATP clients indicated that 75 percent would have continued their project would have continued in some form without ATP funding. For these reasons, the ATP program simply cannot compete with NIST's Nobel-Prize-winning basic and applied research as a federal priority.

#### **National Science Foundation**

Q7. *The FY 2008 budget request for the National Nanotechnology Initiative (NNI) is \$1.45 billion, which is roughly four percent above the FY 2007 funding estimate. As you are aware, there have been many calls from academia and industry for a more robust and more tightly focused research effort on the environmental, health and safety (EHS) aspects of nanotechnology. The funding allocated for EHS research under the NNI program has been about three percent of the total program, and some outside groups have claimed this is an overly optimistic estimate. How does the FY 2008 budget for the NNI reflect these repeated calls for significant growth of funding for research in this area?*

A7. NNI participating agencies are committed to supporting EHS aspects of nanotechnology, and their allocations to these programs has been increasing to match the flow of qualified proposals in this area.

The amount of funding that is going to programs whose *primary purpose* is to understand and address potential risks to health and to the environment posed by nanotechnology is up 55 percent over 2006 actual expenditures and up 28 percent over the 2007 request. [Estimates for FY 2007 spending in this area based on appropriations are not yet available.] These estimates do not include substantial research on instrumentation and metrology and on fundamental biological interactions upon exposure to nanomaterials, both of which will be important in the performance and interpretation of toxicological research. In addition, research to determine toxicity is a lengthy process; increased spending cannot shorten the time it takes to do certain types of toxicological studies.

The Nanotechnology Environmental and Health Implications (NEHI) Working Group, the interagency group that coordinates EHS research under the NNI, is in the process of prioritizing the EHS research needs based on the report released in September 2006 entitled *Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials*. The NEHI Working Group reports are developed by consensus, however final budget allocations are made by the individual agencies in the context of their respective missions and requirements.

Q8. *Funding for the National Information Technology Research and Development (NITRD) program is held flat in the FY 2008 request. Although the NSF funding contribution for NITRD grows by \$90 million, or 10 percent, the NIH contribution drops by \$78 million, or 14 percent. Given the value of information technology to advancing medical research and improving the efficiency and lowering the cost of health care delivery, what is the rationale for this drop in NIH funding for the principal federal R&D effort in information technology?*

A8. For the past several years, the NITRD budget estimates for NIH have exceeded actual expenditures after appropriations. For example, NIH's budget estimate for NITRD for 2006 as reported in the 2007 Budget Supplement was \$500.6M, whereas the actual expenditures on projects that competed successfully were \$432M. Similarly, the NIH budget request estimate for 2007 was \$490.7M, whereas after receiving the final FY 2007 appropriations level, the estimate was revised to \$426M. The actual expenditures will be determined by the number of projects that successfully compete in FY 2007.

## Department of Energy

*Q9. The Administration appears to place low priority on energy efficiency programs. (The Federal Energy Management Program, Industrial Technologies, and Weatherization Assistance are all slated for cuts in the FY 2008 budget request.) Given the effectiveness of energy efficiency at reducing greenhouse gas emissions and reducing consumer costs, why are these programs getting short shrift?*

A9. The reduction in Weatherization Assistance enables DOE to spend more on priority programs in the President's Advanced Energy Initiative, such as solar energy and biofuels. Even so, DOE plans to weatherize more than 54,000 homes with FY 2008 funding. The FY 2008 request for Industrial Technologies (\$46M) and the Federal Energy Management Program (\$17M) are essentially the same as the FY 2007 request in those areas.

*Q10. A report released in January by the Massachusetts Institute of Technology found that geothermal energy could supply a substantial portion of the United States' future electricity requirements with minimal environmental impact and probably at competitive prices. Given the promise of this often overlooked technology, why is the Administration trying to completely cut all R&D in this area?*

A10. Over 30 years of federal funding in this area has contributed to successful commercialization of improved geothermal technologies. Therefore, policy efforts are now focused on encouraging industry to build new geothermal plants. For example, EPACT 2005 enacted several incentives for geothermal power, including attractive lease royalties, streamlined leasing procedures, and a 1.5 cents/kWh production tax credit. Largely as a result of these incentives, there are currently 58 geothermal construction projects underway in nine states, representing 2,250 MW of new generating capacity (compared to 2,800 MW of existing U.S. geothermal capacity).

*Q11. The budget requests close to \$200 million to invest in vehicle technologies, particularly plug-in hybrid technologies. At the recent Detroit Auto Show, GM announced their plans to produce a plug-in hybrid by 2010. Could you talk about the process of commercializing DOE energy research? Could you talk about how DOE research intersects with R&D that is occurring in the private sector, what is being done to avoid duplication of effort, and how DOE advancements will make it into the commercial market quickly and smoothly?*

A11. The DOE FreedomCAR and Fuel Partnership, with cost-shared funding through the DOE Vehicle Technologies program, is a government-industry partnership that conducts technology roadmapping and prioritization of jointly funded research and development activities in this area.

This collaboration seeks to minimize duplication of effort and accelerate commercialization of advanced vehicle technologies. Industry partners include BP America, Chevron Corporation, ConocoPhillips, Exxon Mobil Corporation, Shell Hydrogen LLC, and the United States Council for Automotive Research (USCAR)—a legal partnership among DaimlerChrysler Corporation, Ford Motor Company, and General Motors Corporation. The key technology hurdle for plug-in hybrid vehicles is advanced energy storage, which receives \$42M in the FY 2008 request, an \$11M increase (+35 percent) over the FY 2007 request.

*Q12. According to the Energy Information Administration, hydropower currently provides seven percent of U.S. electricity supply, yet the Administration has requested zero R&D funds for this technology. Are advances in hydropower efficiency and even small-scale hydropower not worth investigation?*

A12. Market barriers to private sector investment in hydropower R&D are minimal. Therefore, consistent with R&D Investment Criteria on the necessity of market barriers to justify federal investment, the decision has been made to close out the Hydropower Program.

*Q13. Why has funding for R&D in Electricity Delivery and Reliability been cut 10 percent (from \$95 million to \$85 million) when there is significant work to be done in modernizing and securing the Nation's electricity grid?*

A13. The decrease in funding reflects a refocusing of the High Temperature Superconductivity (HTS) activity. In FY 2008, the program will not focus on development of HTS motors and generators, an activity initiated prior to FY 2006. Instead, the program will primarily support the development and commercialization of superconducting cable systems and wires, which could improve the capacity of electricity transmission and distribution in urban areas.

*Q14. The President is proposing to develop three Bioenergy Research Centers through the Office of Science at DOE—up from two proposed in the original plan. What technical or scientific areas will the third research center investigate that are not being addressed by the other two?*

A14. The third Bioenergy Research Center will increase the overall research capability of the DOE Genomes-To-Life (GTL) program to address barriers to commercial feasibility of key energy technologies. In its 2006 review of the GTL program, the National Academies recommended that GTL facilities focus not on particular technologies, but on fundamental research that underpins bioenergy technologies. Consistent with this recommendation, each of the three Bioenergy Research Centers will have long- and intermediate-term visions in bioenergy research, with sufficient flexibility to allow adjustments in research directions in response to promising developments. These Centers are envisioned to serve as catalysts for bioenergy-related research supported by the broader GTL program.

*Q15. Despite the Administration's enthusiasm for the project, the Global Nuclear Energy Project has received an unenthusiastic reception in Congress. As you know, there are major concerns about whether the project will prove to be worth the enormous costs forecast for the coming years. What can you tell us today to allay these concerns and convince us that the project warrants a 400 percent increase in funding over FY 2006 levels, and even greater increases in years to come?*

A15. The Budget provides \$395 million for GNEP R&D and related activities, including design work on engineering- and commercial-scale facilities, economic analysis, and alternative business plans needed for a Secretarial decision by June 2008 on the future direction of the program. Funding for GNEP is for essential research and design activities. No funds are provided for procurement of equipment, facilities or construction activities on any reprocessing, advanced burner reactor, or fuel cycle facility.

*Q16. The FY 2008 budget request once again proposes to eliminate R&D in Oil and Gas, and even goes as far as asking Congress to repeal a provision in EPACT 2005 in this area. Contrary to the assertion that these were handouts to the super-major oil companies, these programs actually focused on developing technologies for difficult-to-reach deposits on shore and in the ultra-deep waters of the Gulf of Mexico, and to some extent for companies that otherwise cannot afford such expensive R&D. At a time of record high prices for both oil and gas, and widespread concern about our over-reliance on foreign energy, does it make sense to slash programs that increase supply, allow smaller independent producers to compete in a market with the super-majors, and ultimately drive down costs of these fuels?*

A16. Oil and gas are mature industries and both have every incentive, particularly at today's prices, to enhance production and continue research and development of technologies on their own. Oil companies, along with the oil services industry, have shown remarkable engineering prowess, including when it comes to offshore engineering. There is no need for taxpayers to subsidize oil companies in these efforts. The Administration's Research and Development Investment Criteria direct programs to avoid duplicating research in areas that are receiving funding from the private sector, especially for evolutionary advances and incremental improvements.

The 2008 Budget proposes to expand access to oil and gas resources, streamline permitting processes, and make the R&D investment tax credit permanent. These changes will leverage private sector ingenuity and are preferred ways to increase domestic production of oil and gas rather than federally funded R&D. The Department expects the service industry to continue to provide technological innovations for use by major and independent producers.

#### **National Oceanic and Atmospheric Administration (NOAA)**

*Q17. The National Weather Service (NWS) received a substantial increase in the President's FY 2008 request including an expansion of the Tsunami Warning Network (\$17.2 million). How will this increase in funding translate into faster and more accurate warnings for tsunamis worldwide?*

A17. Note: The increase in NOAA/NWS funding for Strengthening the U.S. Tsunami Warning and Mitigation Program is \$1.7M, not \$17.2M as stated in the question.

The total funding for the NOAA/NWS tsunami program for FY08 is \$23.2M. This \$23.2M fully funds the extended warning operations of two Tsunami Warning Cen-

ters (Pacific Tsunami Warning Center, Ewa Beach, HI and the West Coast/Alaska Tsunami Warning Center, Palmer AK) into round-the-clock, fully staffed centers serving the Pacific and Arctic Ocean regions, the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico, as well as interim warning information for the Indian Ocean. NOAA is also working to facilitate robust tsunami detection including deployment, operation, and maintenance of the 39 DART buoy station network. Of these 39 DART stations, 32 are sited throughout the Pacific Rim—which historically is the most active seismic source for tsunamis. These 32 DART stations will provide timely and effective tsunami detection for just about all countries that border the Pacific Rim. In addition, of the seven DART stations to be sited throughout the Atlantic-Caribbean Sea-Gulf of Mexico, five DARTs will provide accurate and timely tsunami warnings of a tsunami generated in the S. Atlantic/Caribbean Sea. Upgrades of eight seismic stations and 33 Tsunami-ready sea level stations, as well as the addition of 16 new sea level stations, enhance and modernize the existing system to increase coverage and accuracy of forecasts and warnings.

Improvements in the forecast system include advancing coastal mapping, hazard assessment, and inundation modeling for all vulnerable areas. USGS seismic station expansion, especially in the Caribbean, and integration with other U.S. and global ocean and coastal observation systems will improve NOAA/NWS ability to more rapidly determine the location and magnitude of seismic events that might trigger a tsunami. NOAA is also creating and leveraging partnerships through the National Tsunami Hazard Mitigation Program to develop capacity for community-based hazard mitigation to improve preparedness of at-risk areas in the U.S. and its territories. It is an integrated Federal Government program with State, community and global partners.

*Q18. The budget request cuts nearly \$4 million in the NOAA budget for NASA-NOAA Partnerships to transition research into operations. The transition of research missions of NASA into operational systems at NOAA is a perennial problem. Why were these funds cut? What activities are eliminated due to this cut? What is the Administration doing to address this problem?*

*A18.* This item has never been included in the Administration's budget requests for NOAA. Congress provided funds for this program through earmarks in FY 2005 and FY 2006. With regard to FY 2007, under the terms of the year-long continuing resolution, NOAA has indicated that it has been able to provide \$3.7 million for this effort under the terms of the year-long continuing resolution. However, this item was not included in the FY 2008 budget request as NOAA will be continuing this work as part of its core operations.

NOAA and NASA have formed a Joint Working Group on Research to Operations to improve interagency coordination, information-sharing and planning on this topic. Both agencies have indicated that they are committed to finding effective long-term solutions to the long-standing problem of financing the transition of research data products into operational data streams. OSTP has an interest in this issue as well, and will monitoring these coordination efforts.

#### **Questions submitted by Representative Eddie Bernice Johnson**

*Q1. I have serious concerns about cuts to NASA's aeronautics research and development programs, as well as its education programs. Will these programs see further cuts, while human space exploration initiatives will see only modest increases? How will this affect the local workforce?*

*A1.* NASA has made significant progress in reformulating its approach to aeronautics research by aligning its aeronautics activities with the President's recently issued National Aeronautics Research and Development Policy, with the purpose of advancing U.S. technical leadership in aeronautics. In conjunction with this effort, NASA is collaborating with the broad research community, including industry, academia, and other government agencies. The FY 2008 budget request for NASA's aeronautics programs includes programmatic content increases in excess of \$270 million from FY 2008 to FY 2012 relative to the President's FY 2007 request.

Education is and will continue to be a fundamental element of NASA's activities, reflecting a diverse portfolio of pre-college, informal and higher education programs. The funding requested for NASA Education activities in the FY2008 President's Budget Request should be sufficient to maintain NASA's efforts to provide content, resources and facilities in support of workforce development.

Regarding its workforce, NASA has recently instituted the responsibility of monitoring and managing the workforce at an Agency-level, rather than at a programmatic level, in order to better integrate workforce considerations into early pro-

gram and budget planning and to continue identifying the skills the overall Agency will require in the future. It would be premature to attempt to predict the impact of funding decisions on a center-by-center basis at this juncture. The workforce required by any program (including Aeronautics and Education) will be balanced against the workforce requirements of the agency as a whole, and ultimately reflected in the workforce maintained at each center.

*Q2. I am pleased to see that fusion energy funding will be increased, especially the International Thermonuclear Experimental Reactor (ITER). The U.S. must contribute its fair share in international clean energy research and development activities. What is the time frame for fusion reactors to be used commercially? Is nuclear energy research at a place where we can guarantee safety and minimize waste?*

A2. ITER will, if successful, move towards developing fusion's potential as a commercially viable, clean, long-term source of energy near the middle of the century.

U.S. nuclear plants have an outstanding record of safety and reliability throughout the last 15 years, and we will continue to place safety as our highest priority in future nuclear programs. The Global Nuclear Energy Partnership proposes to close the fuel cycle domestically, as has been done in other countries, by recycling spent nuclear fuel for use in fast reactors, therefore drastically reducing the amount of high-level radioactive waste to be placed in a permanent geologic repository. The Department of Energy continues to fund research and development to ensure safety and reduce the waste associated with nuclear power.

*Q3. Regarding National Science Foundation: I am glad to see the Education and Human Resources division is set for increases greater than inflation. I am also pleased the agency is investing in activities to broaden participation in science, technology, engineering and math. However, the K-12 program funding would see a nine percent decrease from the FY07 level and flat funding relative to the President's FY07 request. This is a problem, and I've said many times it is important for NSF to reach kids at a young age. What programs will be most affected by the K-12 decrease?*

A3. The National Science Foundation has several programs which support K-12 education. Within the Directorate for Education and Human Resources, Discovery Research K-12 and the Math and Science Partnerships programs are the Agency's primary programs aimed at improving K-12 education. The President's FY 2008 budget request includes \$107 million for the Discovery Research K-12 program, a level equal to the FY 2007 request, but \$12.08 million over the FY 2006 actual level. Given that the FY 2007 Joint Continuing Resolution provides no increases for the EHR budget, the FY 2007 funding level for DRK-12 is below the President's budget request. The President's FY 2008 budget includes \$46 million for the Math and Science Partnerships (MSP) Program, which will provide \$30 million for new awards in FY 2008.

Additional programs supporting K-12 education include the Advanced Technological Education (ATE) Program, managed by the Division of Undergraduate Education (DUE), which provides support to high school students engaged in NSF-supported technician training programs. Similarly, the National STEM Digital Library, also managed by DUE, provides educational resources to teachers and students at all levels and in formal and informal settings. The Informal Science Education and Outreach program, while not exclusively a K-12 program, supports the development films, museum exhibits and activities focused on the needs and interests of the entire population, including K-12 students and their teachers. And K-12 education activities are not limited to programs managed by the Education and Human Resources Directorate. Many research grants funded through the R&RA budget also include K-12 education and outreach activities, including teacher professional development programs. All of these programs, and others, contribute to advancing K-12 education, which we agree is a high priority.

The FY 2008 request for Informal Science Education is \$66 million, level with the FY 2007 request but an increase of \$3.35 million over the FY 2006. And the FY 2008 request for the Division of Undergraduate Education includes \$51.62 million for the ATE program and \$16.5 million for the NDSL program, increases over the FY 2007 request of \$5.12 million and \$500,000, respectively. Therefore, I believe that the President's FY 2008 budget includes significant increases in funding for K-12 education through a variety of programs, including MSP, ATE, NDSL and the R&RA budget line.

We look forward to the results of the Academic Competitiveness Council's efforts to inventory and evaluate the success of current STEM education programs across the Federal Government so that in the future, we can focus our investments on pro-

grams that are proven effective or that at least have a clear plan for using rigorous evaluation to understand the impact of educational activities and interventions on student learning.

*Q4. Finally, the Advanced Technology Program and Manufacturing Extension Partnership are two initiatives at the National Institute for Standards and Technology that are important for innovation and sustaining small manufacturers.*

*Why does the Administration propose eliminating ATP and cutting MEP by 56 percent, when a bipartisan Congress insists on protecting these programs?*

A4. The President's request will ensure that funding goes to vital basic research to strengthen the Nation's innovation enterprise vital to manufacturing—especially in the areas of physical sciences, engineering, computing, and nanotechnology—instead of subsidizing research and consulting services that should be funded by private industry. Creating an innovation environment by supporting basic research has the highest payoff for all of society, including industry. Basic research results which can be used by a variety of researchers in academia and industry are much more important to economic development than are subsidies, through the Advanced Technology Program (ATP) or Manufacturing Extension Partnership (MEP) program, that benefit particular firms and their shareholders. Large shares of ATP funding have gone to major corporations that could well fund, and have well benefited from, investments in these technologies. Past reviews by the Government Accountability Office have found that ATP-funded projects are often similar to those conducted by firms not receiving such subsidies. In addition, the 2007 House Floor and Senate committee bills would have terminated ATP.

The 2008 Budget request provides \$46 million for the Manufacturing Extension Partnership program, equal to the 2007 Budget. MEP Centers provide manufacturing firms with consulting services that are also available through private entities. Given the benefits reported by MEP clients, it is reasonable to have these clients share a larger proportion of the cost of these services. The FY 2008 Budget request would maintain a network of MEP centers that are funded according to their performance and need, and would encourage these Centers to be more efficient by reducing their overhead costs, including high marketing costs. Centers could also ask MEP clients to cover more of the cost of the services through modestly increased fees.

#### **Questions submitted by Representative Daniel Lipinski**

##### **Department of Energy**

##### **Energy Efficiency and Renewable Energy (EERE):**

*Q1. Geothermal—A report released in January by the Massachusetts Institute of Technology found that geothermal energy could supply a substantial portion of the United States' future electricity requirements with minimal environmental impact and probably at competitive prices. Given the promise of this often overlooked technology, why is the Administration trying to completely cut all R&D into its potential?*

A1. Please see response to Chairman Gordon's tenth question.

*Q2. Hydrogen—Of all renewable energy technologies, R&D for hydrogen receives the largest funding allocation in the President's budget request. This also completes the President's commitment to \$1.2 billion in hydrogen funding over five years. Is it expected that funding for Hydrogen will continue at these levels, or will resources now be directed to other areas of energy research with nearer-term implications?*

A2. While hydrogen technology continues to represent an important area for energy research and development, decisions about funding levels beyond FY 2008 have not been determined.

*Q3. The Industrial Technologies Program, which directly aids many small- to medium-sized businesses in the Chicagoland area and throughout the country in identifying technology areas in which large potential for energy savings may be realized, is facing the chopping block once again. Additionally, this budget proposes gutting the National Renewable Energy Laboratory. How can you justify these cuts when the President cited technology as the savior to breaking our oil addiction in his State of the Union address last year?*

A3. To improve operating efficiency, DOE is shifting the management of some sub-contracted projects from the National Renewable Energy Laboratory (NREL) to the Golden Field Office and the National Energy Technology Lab. This shows up in the funding line but does not represent a cut in funding for research conducted at NREL itself. The FY 2008 request for Industrial Technologies (\$46M) is essentially the same as in the FY 2007 request. DOE is focusing additional funding on priority programs in the Advanced Energy Initiative, such as solar energy and biofuels.

#### Office of Science:

Q4. *The President is proposing to develop three Bioenergy Research Centers through the Office of Science at DOE—up from two proposed in the original plan. The State of Illinois is blessed with not only an abundance of rich cropland yielding vast acreages of corn and the potential for switchgrass, but also numerous first-rate Universities, Laboratories, and Companies that are expanding our knowledge in the field of alternative energy. The University of Illinois at Urbana-Champaign, in collaboration with Argonne National Laboratory, Northwestern University, the University of Chicago, the University of Illinois at Chicago, Archer Daniels Midland, and others submitted a proposal recently for the Bioenergy Research Institute. These institutions bring together the scientific expertise and resources needed to develop new energy sources and reduce our reliance on imported oil. What technical or scientific areas will the third research center investigate that are not being addressed by the other two? We think that the UIUC application is good, and a Center in the Midwest would be really invaluable. Can you comment on a timeframe on when a center will be selected?*

A4. The third Bioenergy Research Center will increase the overall research capability of the DOE Genomes-To-Life (GTL) program to address barriers to commercial feasibility of key energy technologies. In its 2006 review of the GTL program, the National Academies recommended that GTL facilities focus not on particular technologies, but on fundamental research that underpins bioenergy technologies. Consistent with this recommendation, each of the three Bioenergy Research Centers will have long- and intermediate-term visions in bioenergy research, with sufficient flexibility to allow adjustments in research directions in response to promising developments. These Centers are envisioned to serve as catalysts for bioenergy-related research supported by the broader GTL program. The Office of Science will select and initiate two Bioenergy Research Centers in FY 2007 and will add and support a third Center in FY 2008.

Q4a. *Flat funding for DOE science in recent years has forced the Office of Science to scale back the degree to which it is able to make extramural grant awards. Of course, because it operated large user facilities—certainly an important function of the DOE—it is the core research programs and extramural grants that suffer the most. The reduction in DOE extramural research funding is particularly noticed in physics departments and certainly fields of engineering at our universities. How will the funding increases that are proposed in the President's budget for the DOE Office of Science affect DOE ability to increase the number of grants it is able to make to colleges and universities? How is it expected to impact DOE grant award success rates?*

A4a. In recent years, nearly 50 percent of the Office of Science's research funding has been awarded to colleges, universities and private institutes. In the FY 2008 budget, additional funding has been provided for a number of Office of Science programs that fund extramural research institutions as well as scientific user facilities and national laboratories. The exact allocation of these funds and the grant award success rates will depend on the results of competitive solicitations and the research needs of individual programs.

#### NIST

##### Manufacturing Extension Partnership (MEP)

Q5. *Since 2001, we have lost 2.9 million manufacturing jobs and last year alone we lost another 110,000 manufacturing jobs. These jobs are high-skill, high-wage jobs that on average pay 23 percent more than the national average and are the backbone of communities across the country. Last year, the Administration announced its American Competitiveness Initiative during the State of the Union address. From my point of view, competitiveness is about job creation and retention. I would like to give you this opportunity to explain to our constituents and small manufacturers across the country why the Administration proposed to gut*

*the Manufacturing Extension Partnership program that has a proven track record in creating and retaining good jobs and growing the economy.*

A5. NIST meets the Nation's highest priorities by focusing on high impact research and investing in the capacity and capability of MST's user facilities and labs. This emphasis is validated by the high rate of return to the Nation that the NIST labs already have demonstrated. Nineteen retrospective studies of economic impact show that, on average, NIST labs generated a benefit-to-cost ratio of 44:1 to the U.S. economy. The President's request will ensure that funding goes to vital basic research to strengthen the Nation's innovation enterprise vital to manufacturing—especially in the areas of physical sciences, engineering, computing, and nanotechnology—instead of subsidizing research and consulting services that should be funded by private industry. Creating an innovation environment by supporting basic research has the highest payoff for all of society, including industry. Basic research results which can be used by a variety of researchers in academia and industry are much more important to economic development than are subsidies, through the Manufacturing Extension Partnership (MEP) program, that benefit particular firms and their shareholders.

MEP Centers provide manufacturing firms with consulting services that are also available through private entities. Given the benefits reported by MEP clients, it is reasonable to have these clients share a larger proportion of the cost of these services. The FY 2008 Budget request would maintain a network of MEP centers that are funded according to their performance and need, and would encourage these Centers to be more efficient by reducing their overhead costs, including high marketing costs. Centers could also ask MEP clients to cover more of the cost of the services through modestly increased fees.

Q6. *The 2005 MEP Assessment found \$6.3 billion in increased/retained sales; \$2.2 billion in modernization investment; and 53,000 jobs created or retained. These documented results represent only a small portion of the MEP's total impact. We get these impressive results from a federal investment of only \$104 million. What other federal programs to support manufacturers show a similar documented return on investment? Given the MEP's success rate and that small- and medium-sized manufacturers are struggling in the face of global competition, why does the Administration want to cut the MEP budget by more than 50 percent?*

A6. Please refer to the response above.

#### **NOAA**

Q7. *Despite the findings released in last week's Working Group I report of the UN's Intergovernmental Panel on Climate Change, the budget proposal cuts funding for NOAA's Climate Change Science Program (CCSP) by 7.4 percent. This is the fourth year in a row for steep cuts to climate science. How can you justify this cut when even the President recognized the problem of climate change in his State of the Union address only one month ago?*

A7. The 2007 CCSP figures included in the 2008 President's Budget were based on estimates of anticipated appropriations for the CCSP agencies at the time the Budget was submitted. Actual appropriations, made after the 2008 Budget was submitted, varied from those estimates; therefore, the 2007 CCSP figures provided in the 2008 Budget were not accurate. In addition, the 2008 CCSP funding data were also not final estimates. The Administration continues its strong support for the Climate Change Science Program in 2008. Final estimates of government-wide expenditures for 2007 enacted and 2008 proposed funding levels will be available in the *FY 2008 Federal Climate Change Expenditures Report*, which is expected to be published in early May.

#### **National Science Foundation**

Q8. *Nanotechnology—The FY 2008 budget request for the National Nanotechnology Initiative (NNI) is \$1.45 billion, which is roughly four percent above the FY 2007 funding estimate. As you are aware, there have been many calls from academia and industry for a more robust and more tightly focused research effort on the environmental, health and safety (EHS) aspects of nanotechnology. The funding allocated for EHS research under the NNI program has been about three percent of the total program, and some outside groups have claimed this is an overly optimistic estimate. How does the FY 2008 budget for the NNI reflect these repeated calls for significant growth of funding for research in this area?*

A8. Please see response to Chairman Gordon's seventh question.

Q9. *Overall funding for K-12 programs in the FY08 request is flat compared to the President's FY07 request. As an engineer and former educator, I understand the critical importance of STEM education to our children, and the need to support this if we want to maintain America's competitive and innovative edge in the world. Can you elaborate on why you have not put more emphasis on K-12 STEM education, to ensure that we are raising the next generation of engineers, scientists, and teachers?*

A9. Please see response to Representative Johnson's third question.

Q10. *Last year, the success rates at NSF dipped to approximately 21 percent, the lowest success rate in approximately 15 years. Moreover, there are concerns that to increase success rates at NSF will attempt to limit the number of proposals that any one institution can submit to large grant solicitations, effectively placing the burden of peer review on universities who are being forced to conduct their own internal proposal reviews. Two questions: First, what are the success rates expected to be with the increased NSF funding levels proposed in the budget? Second, do you support institutions' limitations on the number of grant awards that can be submitted by a given university, even though the quality of two proposals submitted from one institution might be better than one submission made from another institution?*

A10. Success rates are a function of the number of proposals submitted versus the available funding for a given program. Although it is assumed that an increase in budget would result in an increase in proposal success rates, we have seen during the doubling of the NIH budget that an increase in budget can generate enthusiasm and draw people to a field, having the ultimate effect of further reducing success rates. Therefore, while success rates can be informative of important trends, such as oversupply or undersupply of scientists in a particular field, budget decisions should not be based solely on success rates since both an increase and a decrease in funds could equally result in reduced success rates. I would expect that an increase in the NSF's budget might have the initial effect of increasing success rates, but could result in an overall further decline in success rates as more scientists are attracted to well-funded fields of research. NSF can also see an increase in proposals from established researchers as mission agencies (in particular NIH and Defense) adjust their priorities and the focus of their extramural research portfolios.

I do not believe that NSF should artificially increase success rates by limiting the number of grant proposals that are submitted by individual universities. However, I am sympathetic that as NSF's budget increases and more proposals are received for various reasons, there are additional stresses on already taxed personnel, management, and information technology systems which will all need to be addressed. I support NSF's interest in looking for new ways to streamline the proposal review process, such as through the use of pre-proposals. At present, there are over 350 active funding opportunities at NSF to which proposers may submit proposals. Of these, 31 (less than ten percent) impose some sort of limit on proposal submissions from a single institution. One of the primary reasons that a program may impose a limit on the number of submissions from a single institution is that investing in building large infrastructure, developing broad partnerships, and establishing research centers ought to be done in the context of an institution's longer-term strategic priorities, to ensure that these efforts will be sustained beyond the life of the NSF award. In addition, for programs with very broad appeal, imposing institutional submission limitations helps to broaden participation to include more, diverse institutions. Artificially increasing success rates is not one of the reasons for limiting proposal submissions.

#### **Department of Defense**

Q11. *In preparation for the Administration's FY08 budget, last summer you [Dr. Marburger] and OMB Director Rob Portman issued a memorandum on the Administration's R&D budget priorities. In that memo, you noted the importance of continuing the American Competitiveness Initiative investments in the NSF, the DOE's Office of Science, and NIST. You also specifically noted the "high-impact basic and applied research of the Department of Defense should be a significant priority." The Pentagon apparently did not get or ignored the memorandum, because its requested funding level for DOD basic research is 8.7 percent below the FY07 funding level and only 0.4 percent above the FY07 budget request. For that matter, the FY08 budget request for DOD science and tech-*

*nology accounts calls for a 19.2 percent cut in funding from the FY07 funding level and 2.7 percent below the FY07 budget request.*

*First, can you explain why DOD research is not part of the Administration's American Competitive Initiative? Second, regardless of whether defense research is part of the ACI, why, despite all the rhetorical support for defense research, aren't the basic research accounts increasing?*

A11. Unfortunately, the research budget picture at the Department of Defense is severely distorted by earmarks, which account for all of the 19 percent cut you refer to. In FY 2007, there were over 600 DOD research earmarks (6.1 and 6.2) totaling \$1.2 billion. This research is not merit reviewed and is often outside of DOD's mission. For instance, Congress directed DOD to fund research on a wide range of diseases including diabetes, neurofibromatosis (a genetic disorder of the nervous system), and childhood cancer. Congressional adds in DOD's budget for medical research projects total about \$500 million in 2007 alone. While research on these diseases is very important, these diseases are not unique to the U.S. military and the research can be better selected, carried out and coordinated within civil medical research agencies, without disruption to the military mission. At the same time, the intrusion of earmarking into the peer-review processes of civilian medical research agencies would have a significant detrimental impact on funding the most important and promising research.

It is true that DOD research helps to drive innovation and makes valuable contributions toward the goals of the ACI. As the ACI policy booklet stated: "The Department of Defense. . .provides strong support for the physical sciences and engineering, including projects with both commercial and military applications ("dual-use" technologies). Past DOD research has resulted in revolutionary technological capabilities such as radar, digital computers, wireless mobile communications, lasers, fiber optics, composite materials, the Internet (and other "packet switched" networks), and satellite navigation." This research has grown by nearly \$850 million since 2001. DOD will continue to play an important role in the American Competitiveness Initiative. The ACI does not place all agencies important to its goals on a budget-doubling track because the current budget status of agencies varies with respect to the challenges, opportunities, and capacities related to long-term economic competitiveness. DOD's current nearly \$6 billion research budget positions it well relative to other key ACI agencies to play its historical role in these areas, especially if currently earmarked funds become available for priority research areas.